

1071-1st Chem Exam-1071017(A)

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

1) The correct answer (reported to the proper number of significant figures) to the following is _____.

$$(2.05631)(6.9391136) / 12.59326 = \underline{\hspace{2cm}}$$

- A) 1.133064
- B) 1.1361
- C) 1.13306
- D) 1.1330639
- E) none of the above

Answer: C

2) In the following list, only _____ is not an example of a chemical reaction.

- A) dissolution of a penny in nitric acid
- B) the rusting of iron
- C) the formation of polyethylene from ethylene
- D) the condensation of water vapor
- E) a burning candle

Answer: D

3) An object will sink in a liquid if the density of the object is greater than that of the liquid. The mass of a sphere is 4.69 g. If the volume of this sphere is less than _____ cm^3 , then the sphere will sink in liquid mercury (density = 13.6 g/cm^3).

- A) 2.90
- B) 7.48
- C) 0.345
- D) 1.08
- E) none of the above

Answer: C

4) A temperature of 300 K is the same as _____ $^{\circ}\text{F}$.

- A) 351
- B) 81
- C) 63
- D) 260
- E) 711

Answer: B

5) _____ is the abbreviation for the prefix "milli".

- A) M
- B) k
- C) d
- D) m
- E) n

Answer: D

6) The number 1.00430 has _____ significant figures.

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

Answer: A

7) The density of mercury is 13.6 g/cm^3 . The density of mercury is _____ kg/m^3 .

- A) 1.36×10^4
- B) 1.36×10^{-5}
- C) 1.36×10^{-4}
- D) 1.36×10^{-2}
- E) 1.36×10^8

Answer: A

8) The recommended adult dose of Elixophyllin[®], a drug used to treat asthma, is 6.00 mg/kg of body mass. Calculate the dose in milligrams for a 115-lb person. 1 lb = 453.59 g.

- A) 24 B) 1.5 C) 1,521 D) 3.1×10^5 E) 313

Answer: E

9) The correct answer (reported to the proper number of significant figures) to the following is _____.

$$(12.67 + 19.2)(3.99) / (1.36 + 11.366) = \underline{\hspace{2cm}}$$

- A) 9.999
B) 9.9985
C) 1.00×10^1
D) 9.99851
E) none of the above

Answer: E

10) There are _____ significant figures in the answer to the following computation:

$$\frac{(29.2 - 20.0) (1.79 \times 10^5)}{1.39}$$

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

Answer: B

11) Which of these metals is the least easily oxidized?

- Na
Au
Fe
Ca
Ag
A) Au B) Fe C) Na D) Ag E) Ca

Answer: A

12) Which one of the following is a triprotic acid?

- A) chloric acid
B) sulfuric acid
C) phosphoric acid
D) nitric acid
E) hydrofluoric acid

Answer: C

13) Which combination will produce a precipitate?

- A) $\text{Pb}(\text{NO}_3)_2$ (aq) and HCl (aq)
B) $\text{Cu}(\text{NO}_3)_2$ (aq) and $\text{KC}_2\text{H}_3\text{O}_2$ (aq)
C) NaOH (aq) and $\text{Sr}(\text{NO}_3)_2$ (aq)
D) $\text{AgC}_2\text{H}_3\text{O}_2$ (aq) and $\text{HC}_2\text{H}_3\text{O}_2$ (aq)
E) KOH (aq) and HNO_3 (aq)

Answer: A

14) Which of the following is insoluble in water at 25 °C?

- A) $(\text{NH}_4)_2\text{CO}_3$
- B) $\text{Ca}(\text{OH})_2$
- C) Na_2S
- D) $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2$
- E) $\text{Mg}_3(\text{PO}_4)_2$

Answer: E

15) What is the concentration (M) of CH_3OH in a solution prepared by dissolving 11.7 g of CH_3OH in sufficient water to give exactly 230. mL of solution?

- A) 0.0841
- B) 1.59
- C) 11.9
- D) 0.00159
- E) 3.17

Answer: B

16) A stock solution of HNO_3 is prepared and found to contain 13.5 M of HNO_3 . If 25.0 mL of the stock solution is diluted to a final volume of 0.500 L, the concentration of the diluted solution is _____ M.

- A) 1.48
- B) 0.270
- C) 0.675
- D) 270
- E) 675

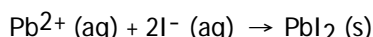
Answer: C

17) With which of the following will the potassium ion form an insoluble salt?

- A) sulfate
- B) chloride
- C) carbonate
- D) sulfate and carbonate
- E) none of the above

Answer: E

18) Lead ions can be precipitated from aqueous solutions by the addition of aqueous iodide:



Lead iodide is virtually insoluble in water so that the reaction appears to go to completion. How many milliliters of 3.550 M $\text{HI}(\text{aq})$ must be added to a solution containing 0.700 mol of $\text{Pb}(\text{NO}_3)_2 (\text{aq})$ to completely precipitate the lead?

- A) 197
- B) 2.54×10^{-3}
- C) 0.394
- D) 394
- E) 0.197

Answer: D

19) Which one of the following is not true concerning 2.00 L of 0.100 M solution of $\text{Ca}_3(\text{PO}_4)_2$?

- A) This solution contains 0.800 mol of oxygen atoms.
- B) 1.00 L of this solution is required to furnish 0.300 mol of Ca^{2+} ions.
- C) This solution contains 6.67×10^{-2} mol of Ca^{2+} .
- D) This solution contains 0.200 mol of $\text{Ca}_3(\text{PO}_4)_2$.
- E) There are 6.02×10^{22} phosphorus atoms in 500.0 mL of this solution.

Answer: A

- 20) A 0.200 M K_2SO_4 solution is produced by _____.
- A) dissolving 43.6 g of K_2SO_4 in water and diluting to a total volume of 250.0 mL
 - B) diluting 20.0 mL of 5.00 M K_2SO_4 solution to 500.0 mL
 - C) dissolving 20.2 g of K_2SO_4 in water and diluting to 250.0 mL, then diluting 25.0 mL of this solution to a total volume of 500.0 mL
 - D) dilution of 250.0 mL of 1.00 M K_2SO_4 to 1.00 L
 - E) dilution of 1.00 mL of 250 M K_2SO_3 to 1.00 L

Answer: B

- 21) With which of the following will the ammonium ion form an insoluble salt?
- A) carbonate
 - B) sulfate and carbonate
 - C) sulfate
 - D) chloride
 - E) none of the above

Answer: E

- 22) Mixing 10.00 mL of an aqueous solution with 10.00 mL of water represents a _____.
- A) tenfold dilution
 - B) crystallization
 - C) titration
 - D) neutralization
 - E) twofold dilution

Answer: E

- 23) What are the respective concentrations (M) of Fe^{3+} and I^- afforded by dissolving 0.200 mol FeI_3 in water and diluting to 725 mL?
- A) 0.828 and 0.276
 - B) 0.145 and 0.435
 - C) 0.276 and 0.828
 - D) 0.145 and 0.0483
 - E) 0.276 and 0.276

Answer: C

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

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

Answer: B

25) The nucleus of an atom does not contain _____.

- A) protons
- B) subatomic particles
- C) protons or neutrons
- D) electrons
- E) neutrons

Answer: D

26) The nucleus of an atom contains _____.

- A) protons and neutrons
- B) protons and electrons
- C) protons
- D) electrons
- E) protons, neutrons, and electrons

Answer: A

27) Predict the charge of the most stable ion of potassium.

- A) 1+
- B) 3+
- C) 2+
- D) 2-
- E) 1-

Answer: A

28) The element X has two naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given 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) 32.73
- B) 30.20
- C) 35.22
- D) 34.02
- E) 33.20

Answer: E

29) Elements in Group 7A are known as the _____.

- A) alkaline earth metals
- B) alkali metals
- C) chalcogens
- D) noble gases
- E) halogens

Answer: E

30) The name of the ionic compound NH_4CN is _____.

- A) ammonium hydrogen cyanate
- B) nitrogen hydrogen cyanate
- C) ammonium carbonitride
- D) ammonium cyanide
- E) cyanonitride

Answer: D

31) The charge on the copper ion in the salt CuO is _____.

- A) -1
- B) +2
- C) +1
- D) +3
- E) -2

Answer: B

32) A certain mass of carbon reacts with 23.3 g of oxygen to form carbon monoxide. _____ grams of oxygen would react with that same mass of carbon to form carbon dioxide, according to the law of multiple proportions?

- A) 46.6 B) 25.6 C) 23.3 D) 11.7 E) 233

Answer: A

33) Elements in Group 6A are known as the _____.

- A) alkaline earth metals
B) alkali metals
C) halogens
D) noble gases
E) chalcogens

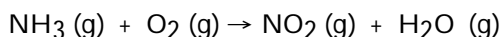
Answer: E

34) The mass number of an atom of ^{128}Xe is _____.

- A) 120 B) 128 C) 182 D) 74 E) 54

Answer: B

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



- A) 4, 7, 4, 6 B) 4, 3, 4, 3 C) 2, 3, 2, 3 D) 1, 3, 1, 2 E) 1, 1, 1, 1

Answer: A

36) The molecular weight of acetic acid ($\text{HC}_2\text{H}_3\text{O}_2$), the acid in vinegar, is _____ amu (rounded to one decimal place).

- A) 59.0 B) 29.0 C) 32.0 D) 60.1 E) 8.0

Answer: D

37) How many grams of sodium carbonate contain 1.773×10^{17} carbon atoms?

- A) 1.517×10^{-5} B) 3.121×10^{-5} C) 6.066×10^{-5} D) 9.100×10^{-5} E) 1.011×10^{-5}

Answer: B

38) A compound that is composed of only carbon and hydrogen contains 80.0% C and 20.0% H by mass. What is the empirical formula of the compound?

- A) $\text{C}_{20}\text{H}_{60}$ B) CH_4 C) CH_3 D) C_2H_6 E) C_7H_{20}

Answer: C

39) How many atoms of nitrogen are in 10 g of NH_4NO_3 ?

- A) 3.5 B) 2 C) 1.5×10^{23} D) 3.0×10^{23} E) 1.8

Answer: C

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

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

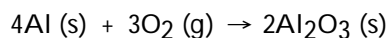
Answer: C

41) How many molecules of CH₄ are in 48.2 g of this compound?

- A) 1.81×10^{24} B) 3.00 C) 5.00×10^{24} D) 4.00 E) 2.90×10^{25}

Answer: A

42) Solid aluminum and gaseous oxygen react in a combination reaction to produce aluminum oxide:



In a particular experiment, the reaction of 2.5 g of Al with 2.5 g of O₂ produced 3.5 g of Al₂O₃. The % yield of the reaction is _____.

- A) 37 B) 66 C) 47 D) 74 E) 26

Answer: D

43) Calculate the percentage by mass of nitrogen in Pb(NO₃)₂.

- A) 8.5 B) 10.4 C) 5.2 D) 12.6 E) 4.2

Answer: A

44) The compound responsible for the characteristic smell of garlic is allicin, C₆H₁₀OS₂. The mass of 1.00 mol of allicin, rounded to the nearest integer, is _____ g.

- A) 61 B) 34 C) 86 D) 19 E) 162

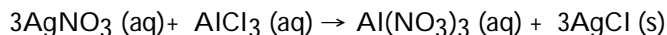
Answer: E

45) There are _____ hydrogen atoms in 25 molecules of C₄H₄S₂.

- A) 100 B) 6.0×10^{25} C) 3.8×10^{24} D) 25 E) 1.5×10^{25}

Answer: A

46) Silver nitrate and aluminum chloride react with each other by exchanging anions:

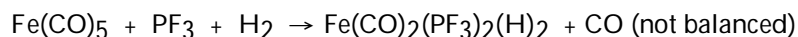


What mass in grams of AgCl is produced when 4.22 g of AgNO₃ react with 7.73 g of AlCl₃?

- A) 11.9 B) 17.6 C) 4.22 D) 3.56 E) 24.9

Answer: D

47) Pentacarbonyliron (Fe(CO)₅) reacts with phosphorous trifluoride (PF₃) and hydrogen, releasing carbon monoxide:

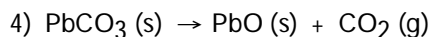
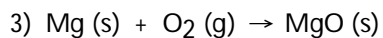
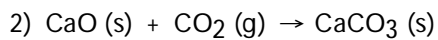
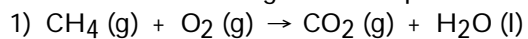


The reaction of 5.0 mol of Fe(CO)₅, 8.0 mol of PF₃ and 6.0 mol of H₂ will release _____ mol of CO.

- A) 6.0 B) 5.0 C) 12 D) 15 E) 24

Answer: C

48) Which of the following are decomposition reactions?



A) 2, 3, and 4

B) 2 and 3

C) 1, 2, and 3

D) 4 only

E) 1, 2, 3, and 4

Answer: D

49) The formula of nitrobenzene is $\text{C}_6\text{H}_5\text{NO}_2$. The molecular weight of this compound is _____ amu.

A) 43.03

B) 3.06

C) 123.11

D) 109.10

E) 107.11

Answer: C

50) How many sulfur dioxide molecules are there in 0.180 mol of sulfur dioxide?

A) 6.02×10^{24}

B) 6.02×10^{23}

C) 1.08×10^{24}

D) 1.80×10^{23}

E) 1.08×10^{23}

Answer: E