Chemistry
1st Semester Practice Exam

1. In the following list, only _____ is not an example of matter.
   A. planets
   B. light
   C. dust
   D. elemental phosphorus
   E. table salt

2. What is the physical state in which matter has no specific shape but does have a specific volume?
   A. gas
   B. solid
   C. liquid
   D. salts
   E. ice

3. A combination of sand, salt, and water is an example of a _____.
   A. homogeneous mixture
   B. heterogeneous mixture
   C. compound
   D. pure substance
   E. solid

4. Which one of the following is a pure substance?
   A. concrete
   B. wood
   C. salt water
   D. elemental copper
   E. milk

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

6. An element cannot _____.
   A. be part of a heterogeneous mixture
   B. be part of a homogeneous mixture
   C. be separated into other substances by chemical means
   D. interact with other elements to form compounds
   E. be a pure substance

7. In the following list, only _____ is not an example of a chemical reaction.
   A. dissolution of a penny in nitric acid
   B. the condensation of water vapor
   C. a burning candle
   D. the formation of polyethylene from ethylene
   E. the explosive reaction of hydrogen with oxygen, which produces water,

8. Which one of the following is not a physical property of water?
   A. It boils at 100°C at 1 atm pressure.
   B. It freezes at 0°C at 1 atm pressure.
   C. It is clear and colorless.
   D. Water exists in solid, liquid and gaseous forms.
   E. It reacts rapidly with potassium metal to form potassium hydroxide.

9. Which of the following is a physical property of sodium chloride?
   A. It is a solid at room temperature.
   B. It dissolves in water.
   C. It melts at a high temperature.
   D. It is not significantly compressible.
   E. All of the above are physical properties of sodium chloride.

10. Of the following, only _____ is a chemical reaction.
    A. melting of lead
    B. dissolving sugar in water
    C. tarnishing of silver
    D. crushing of stone
    E. dropping a penny into a glass of water

11. The SI unit for mass is _____.
    A. kilogram
    B. gram
    C. pound
    D. troy ounce
    E. none of the above

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

13. The temperature of 25°C is _____ in Kelvins.
    A. 103
    B. 138
    C. 166
    D. 248
    E. 298

14. Which of the following shows the relative temperatures correctly?
    A. 12°C > 310 K
    B. 43°C < 300 K
    C. 25°C > 250 K
    D. 158°C > 450 K
    E. All of the above show the relative temperatures correctly.

15. 1 nanometer = _____ picometers
    A. 1000
    B. 0.1
    C. 0.01
    D. 1
    E. 10

16. 1 kilogram = _____ milligrams
    A. 1 x 10^{-6}
    B. 1,000
    C. 10,000
    D. 1,000,000
    E. none of the above

17. "Absolute zero" refers to _____.
    A. 0 Kelvin
    B. 0° Fahrenheit
    C. 0° Celsius
    D. °C + 9/5(°F - 32)
    E. 273.15°C

18. A scientific _____ is a concise statement or an equation that summarizes a broad variety of observations.
    A. law
    B. hypothesis
    C. theory
    D. trend
    E. pattern

19. The initial or tentative explanation of an observation is called a(n) _____.
    A. law
    B. theory
    C. hypothesis
    D. experiment
    E. test

20. What is the volume of a 12.2 g piece of metal with a density of 9.43 g/cm3?
    A. 12.2 cm^3
    B. 1.29 cm^3
    C. 0.773 cm^3
    D. 115 cm^3
    E. none of the above

21. The density of silver is 10.5 g/cm^3. What would be the mass (in grams) of a piece of silver that occupies a volume of 23.6 cm^3?
    A. 248
    B. 0.445
    C. 2.25
    D. 112
    E. 23.6

22. Precision refers to _____.
    A. how close a measured number is to other measured numbers
    B. how close a measured number is to the true value
    C. how close a measured number is to the calculated value
    D. how close a measured number is to zero
    E. how close a measured number is to infinity

23. Accuracy refers to _____.
    A. how close a measured number is to zero
    B. how close a measured number is to the calculated value
    C. how close a measured number is to other measured numbers
    D. how close a measured number is to the true value
    E. how close a measured number is to infinity

24. Which of the following is the same as 0.001 cm?
    A. 0.01 mm
    B. 0.01 dm
    C. 0.01 m
    D. 100 mm
    E. 1 mm

25. Which one of the following is not one of the postulates of Dalton's atomic theory?
    A. Each element is composed of tiny, indivisible particles called atoms.
    B. All atoms of a given element are identical to each other and different from those of other elements.
    C. During a chemical reaction, atoms are changed into atoms of different elements.
    D. Compounds are formed when atoms of different elements combine.
    E. Atoms of an element are not changed into different types of atoms by chemical reactions.

26. The charge on an electron was determined in the _____.
    A. cathode ray tube, by J. J. Thompson
    B. Rutherford gold foil experiment
    C. Millikan oil drop experiment
    D. Dalton atomic theory
    E. atomic theory of matter

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

28. _____ and _____ reside in the atomic nucleus.
    A. Protons, electrons
    B. Electrons, neutrons
    C. Protons, neutrons
    D. none of the above
    E. Neutrons, only neutrons

29. Cathode rays are _____.
    A. neutrons
    B. x-rays
    C. electrons
    D. protons
    E. atoms

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

31. All atoms of a given element have the same _____.
    A. mass
    B. number of protons
    C. number of neutrons
    D. number of electrons and neutrons
    E. density

32. The atomic number indicates _____.
    A. the number of neutrons in a nucleus
    B. the total number of neutrons and protons in a nucleus
    C. the number of protons or electrons in a neutral atom
    D. the number of atoms in 1 g of an element
    E. the number of different isotopes of an element

33. Which atom has the smallest number of neutrons?
    A. carbon-14
    B. nitrogen-14
    C. oxygen-16
    D. fluorine-19
    E. neon-20

34. Which atom has the largest number of neutrons?
    A. phosphorous-30
    B. chlorine-37
    C. potassium-39
    D. argon-40
    E. calcium-40

35. There are _____ electrons, _____ protons, and _____ neutrons in an atom of $^{132}_{54}Xe$.
    A. 132, 132, 54
    B. 54, 54, 132
    C. 78, 78, 54
    D. 54, 54, 78
    E. 78, 78, 132

36. An atom of the most common isotope of gold, ^{197}Au, has _____ protons, _____ neutrons, and _____ electrons.
    A. 197, 79, 118
    B. 118, 79, 39
    C. 79, 197, 197
    D. 79, 118, 118
    E. 79, 118, 79

37. Isotopes are atoms that have the same number of _____ but differing number of _____.
    A. protons, electrons
    B. neutrons, protons
    C. protons, neutrons
    D. electrons, protons
    E. neutrons, electrons

38. The nucleus of an atom contains _____.
    A. electrons
    B. protons, neutrons, and electrons
    C. protons and neutrons
    D. protons and electrons
    E. protons

39. The nucleus of an atom does not contain _____.
    A. protons
    B. protons or neutrons
    C. neutrons
    D. subatomic particles
    E. electrons

40. In the symbol below, X = _____.
    $^{13}_{6}X$
    A. N
    B. C
    C. Al
    D. K
    E. not enough information to determine

41. In the periodic table, the rows are called _____ and the columns are called _____.
    A. octaves, groups
    B. staffs, families
    C. periods, groups
    D. cogeners, families
    E. rows, groups

42. Elements in Group 1A are known as the _____.
    A. chalcogens
    B. alkaline earth metals
    C. alkali metals
    D. halogens
    E. noble gases

43. Elements in Group 7A are known as the _____.
    A. chalcogens
    B. alkali metals
    C. alkaline earth metals
    D. halogens
    E. noble gases

44. Elements in Group 8A are known as the _____.
    A. halogens
    B. alkali metals
    C. alkaline earth metals
    D. chalcogens
    E. noble gases

45. _____ are found uncombined, as monatomic species in nature.
    A. Noble gases
    B. Chalcogens
    C. Alkali metals
    D. Alkaline earth metals
    E. Halogens

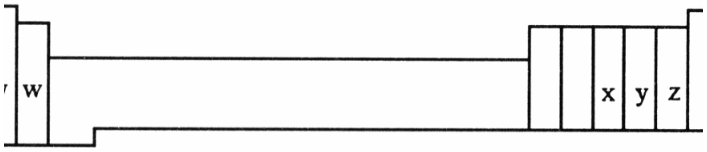
46. When a metal and a nonmetal react, the _____ tends to lose electrons and the _____ tends to gain electrons.
    A. metal, metal
    B. nonmetal, nonmetal
    C. metal, nonmetal
    D. nonmetal, metal
    E. None of the above, these elements share electrons .

47. Which one of the following is most likely to lose electrons when forming an ion?
    A. F
    B. P
    C. Rh
    D. S
    E. N

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

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

50. The correct name for SrO is _____.
    A. strontium oxide
    B. strontium hydroxide
    C. strontium peroxide
    D. strontium monoxide
    E. strontium dioxide



51. Which group of elements is most likely to form ions by losing one electron?
    A. v
    B. x
    C. y
    D. z
    E. w

52. Element X reacts with sodium to form an ionic compound with the formula Na_2X. Element X is a member of group _____.
    A. w
    B. x
    C. y
    D. z
    E. v

53. Of the choices below, which one is not an ionic compound?
    A. PCl_5
    B. $MoCl_6$
    C. RbCl
    D. $PbCl_2$
    E. NaCl

54. Elements in Group 2A are known as the _____.
    A. alkaline earth metals
    B. alkali metals
    C. chalcogens
    D. halogens
    E. noble gases

55. The charge on the manganese in the salt MnF_3 is _____.
    A. +1
    B. -1
    C. +2
    D. -2
    E. +3

56. Which of the following compounds would you expect to be ionic?
    A. H_2O
    B. CO_2
    C. $SrCl_2$
    D. SO_2
    E. H_2S

57. Which formula/name pair is incorrect?
    A. $Mn(NO_2)_2$ manganese(II) nitrite
    B. $Mg(NO_3)_2$ magnesium nitrate
    C. $Mn(NO_3)_2$ manganese(II) nitrate
    D. Mg_3N_2 magnesium nitrite
    E. $Mg(MnO_4)_2$ magnesium permanganate

58. The correct name for $MgCl_2$ is _____.
    A. magnesium dichloride
    B. magnesium chloride
    C. magnesium chlorine
    D. magnesium chlorate
    E. magnesium perchlorate

59. The correct name for Al_2O_3 is _____.
    A. aluminum oxide
    B. dialuminum oxide
    C. dialuminum trioxide
    D. aluminum hydroxide
    E. aluminum trioxide

60. The correct name for CCl_4 is _____.
    A. carbon chloride
    B. carbon tetrachlorate
    C. carbon perchlorate
    D. carbon tetrachloride
    E. carbon chlorate

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

62. The suffix -ide is used _____.
    A. for monatomic anion names
    B. for polyatomic cation names
    C. for the name of the first element in a molecular compound
    D. to indicate binary acids
    E. for monoatomic cations

63. Which one of the following compounds is copper(I) chloride?
    A. CuCl
    B. $CuCl_2$
    C. Cu_2Cl
    D. Cu_2Cl_3
    E. Cu_3Cl_2

64. Which formula/name pair is incorrect?
    A. $FeSO_4$ iron(II) sulfate
    B. $Fe_2(SO_3)_3$ iron(III) sulfite
    C. FeS iron(II) sulfide
    D. $FeSO_3$ iron(II) sulfite
    E. $Fe_2(SO_4)_3$ iron(III) sulfide

65. Which of the following compounds would you expect to be ionic?
    A. SF_6
    B. H_2O
    C. H_2O_2
    D. NH_3
    E. CaO

66. Which metal does not require to have its charge specified in the names of ionic compounds it forms?
    A. Mn
    B. Fe
    C. Cu
    D. Ca
    E. Pb

67. When the following equation is balanced, the coefficients are _____.

$$NH_3 + O_2 \rightarrow NO_2 + H_2O$$

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

68. When the following equation is balanced, the coefficients are _____.

$$Al(NO_3)_3 + Na_2S \rightarrow Al_2S_3 + NaNO_3$$

    A. 2, 3, 1, 6
    B. 2, 1, 3, 2
    C. 1, 1, 1, 1
    D. 4, 6, 3, 2
    E. 2, 3, 2, 3

69. When the following equation is balanced, the coefficient of H_2 is _____.

$$K\,(s) + H_2O\,(l) \rightarrow KOH\,(aq) + H_2\,(g)$$

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

70. When the following equation is balanced, the coefficient of Al is _____.

$Al\ (s) + H_2O\ (l) \rightarrow Al(OH)_3\ (s) + H_2\ (g)$

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

71. When the following equation is balanced, the coefficient of H_2O is _____.

$Ca\ (s) + H_2O\ (l) \rightarrow Ca(OH)_2\ (aq) + H_2\ (g)$

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

72. When the following equation is balanced, the coefficient of Al_2O_3 is _____.

$Al_2O_3\ (s) + C\ (s) + Cl_2\ (g) \rightarrow AlCl_3\ (s) + CO\ (g)$

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

73. Of the reactions below, which one is not a combination reaction?

A. $C + O_2 \rightarrow CO_2$
B. $2Mg + O_2 \rightarrow 2MgO$
C. $2N_2 + 3H_2 \rightarrow 2NH_3$
D. $CaO + H_2O \rightarrow Ca(OH)_2$
E. $2CH_4 + 4O_2 \rightarrow 2CO_2 + 4H_2O$

74. Of the reactions below, which one is a decomposition reaction?

A. $NH_4Cl \rightarrow NH_3 + HCl$
B. $2Mg + O_2 \rightarrow 2MgO$
C. $2N_2 + 3H_2 \rightarrow 2NH_3$
D. $2CH_4 + 4O_2 \rightarrow 2CO_2 + 4H_2O$
E. $Cd(NO_3)_2 + Na_2S \rightarrow CdS + 2NaNO_3$

75. Which of the following are combustion 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) $PbCO_3\ (s) \rightarrow PbO\ (s) + CO_2\ (g)$
4) $CH_3OH\ (l) + O_2\ (g) \rightarrow CO_2\ (g) + H_2O\ (l)$

A. 1 and 4
B. 1, 2, 3, and 4
C. 1, 3, and 4
D. 2, 3, and 4
E. 3 and 4

76. The formula of nitrobenzene is $C_6H_5NO_2$. The molecular weight of this compound is _____ amu.

A. 107.11
B. 43.03
C. 109.10
D. 123.11
E. 3.06

77. The formula weight of potassium dichromate ($K_2Cr_2O_7$) is _____ amu.

A. 107.09
B. 255.08
C. 242.18
D. 294.18
E. 333.08

78. The formula weight of aluminum sulfate ($(Al_2SO_4)_3$) is _____ amu.

A. 342.14
B. 123.04
C. 59.04
D. 150.14
E. 273.06

79. The molecular weight of the acetic acid (CH_3CO_2H) is _____ amu.
    A. 60
    B. 48
    C. 44
    D. 32

80. What is the mass % of carbon in dimethylsulfoxide (C_2H_6SO)?
    A. 60.0
    B. 20.6
    C. 30.7
    D. 7.74
    E. 79.8

81. The mass % of H in methane (CH_4) is _____.
    A. 25.13
    B. 4.032
    C. 74.87
    D. 92.26
    E. 7.743

82. How many molecules of CH_4 are in 48.2 g of this compound?
    A. 5.00×10^{-24}
    B. 3.00
    C. 2.90×10^{25}
    D. 1.81×10^{24}
    E. 4.00

83. What is the mass in grams of 9.76×10^{12} atoms of naturally occurring sodium?
    A. 22.99
    B. 1.62×10^{-11}
    C. 3.73×10^{-10}
    D. 7.05×10^{-13}
    E. 2.24×10^{14}

84. How many moles of carbon dioxide are there in 52.06 g of carbon dioxide?
    A. 0.8452
    B. 1.183
    C. 6.022×10^{23}
    D. 8.648×10^{23}
    E. 3.134×10^{25}

85. How many moles of sodium carbonate contain 1.773×10^{17} carbon atoms?
    A. 5.890×10^{-7}
    B. 2.945×10^{-7}
    C. 1.473×10^{-7}
    D. 8.836×10^{-7}
    E. 9.817×10^{-8}

86. A 2.25-g sample of magnesium nitrate, Mg(NO3)2, contains _____ mol of this compound.
    A. 38.4
    B. 65.8
    C. 148.3
    D. 0.0261
    E. 0.0152

87. The molecular formula of aspartame, the generic name of NutraSweetä, is C14H18N2O5. The molar mass of aspartame is _____ g.
    A. 24
    B. 156
    C. 294
    D. 43
    E. 39

88. Magnesium and nitrogen react in a combination reaction to produce magnesium nitride:

$$3\ Mg + N_2 \rightarrow Mg_3N_2$$

In a particular experiment, a 9.27-g sample of N_2 reacts completely. The mass of Mg consumed is _____ g.

A. 8.04
B. 24.1
C. 16.1
D. 0.92
E. 13.9

89. The combustion of ammonia in the presence of excess oxygen yields NO_2 and H_2O:

$$4\ NH_3\ (g) + 7\ O_2\ (g) \rightarrow 4\ NO_2\ (g) + 6\ H_2O\ (g)$$

The combustion of 28.8 g of ammonia consumers _____ g of oxygen.

A. 94.9
B. 54.1
C. 108
D. 15.3
E. 28.8

90. The combustion of propane (C_3H_8) produces CO_2 and H_2O:

$$C_3H_8\ (g) + 5O_2\ (g) \rightarrow 3CO_2\ (g) + 4H_2O\ (g)$$

The reaction of 2.5 mol of O_2 will produce _____ mol of H_2O.

A. 4.0
B. 3.0
C. 2.5
D. 2.0
E. 1.0

91. Calcium carbide (CaC_2) reacts with water to produce acetylene (C_2H_2):

$$CaC_2\ (s) + 2H_2O\ (g) \rightarrow Ca(OH)_2\ (s) + C_2H_2\ (g)$$

Production of 13g of C_2H_2 requires consumption of _____ g of H_2O.

A. 4.5
B. 9.0
C. 18
D. 4.8×10^2
E. 4.8×10^{-2}

92. The combustion of propane (C_3H_8) in the presence of excess oxygen yields CO_2 and H_2O:

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

When 7.3 g of C_3H_8 burns in the presence of excess O_2, _____ g of CO_2 is produced.

A. 22
B. 7.3
C. 8.0×10^2
D. 2.4
E. 0.61

93. Under appropriate conditions, nitrogen and hydrogen undergo a combination reaction to yield ammonia:

$$N_2\ (g) + 3H_2\ (g) \rightarrow 2NH_3\ (g)$$

A 9.3-g sample of hydrogen requires _____ g of N_2 for a complete reaction.

A. 1.3×10^2
B. 2.0
C. 43
D. 3.9×10^2
E. 4.6

94. Water can be formed from the stoichiometric reaction of hydrogen with oxygen:

$$2H_2\,(g) + O_2\,(g) \rightarrow 2H_2O\,(g)$$

A complete reaction of 5.0 g of O_2 with excess hydrogen produces _____ g of H_2O.

A. 5.6
B. 2.8
C. 2.3×10^2
D. 0.31
E. 11

95. What mass in grams of hydrogen is produced by the reaction of 4.73 g of magnesium with 1.83 g of water?

$$Mg\,(s) + 2H_2O\,(l) \rightarrow Mg(OH)_2\,(s) + H_2\,(g)$$

A. 0.102
B. 0.0162
C. 0.0485
D. 0.219
E. 0.204

96. 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?

$$2S\,(s) + 3O_2\,(g) \rightarrow 2SO_3\,(g)$$

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

97. Solid aluminum and gaseous oxygen react in a combination reaction to produce aluminum oxide:

$$4Al\,(s) + 3O_2\,(g) \rightarrow 2Al_2O_3\,(s)$$

The maximum amount of Al_2O_3 that can be produced from 2.5 g of Al and 2.5 g of O_2 is _____ g.

A. 9.4
B. 7.4
C. 4.7
D. 5.3
E. 5.0

98. Sulfur and fluorine react in a combination reaction to produce sulfur hexafluoride:

$$S\,(s) + 3F_2\,(g) \rightarrow SF_6\,(g)$$

In a particular experiment, the percent yield is 79.0%. This means that a 7.90-g sample of fluorine yields _____ g of SF_6 in the presence of excess sulfur.

A. 30.3
B. 10.1
C. 7.99
D. 24.0
E. 0.110

99. Sulfur and oxygen react in a combination reaction to produce sulfur trioxide, an environmental pollutant:

$$2S + 3O_2 \rightarrow 2SO_3$$

In a particular experiment, the reaction of 1.0 g S with 1.0 g O_2 produced 0.80 g of SO_3. The % yield in this experiment is _____.

A. 30
B. 296
C. 21
D. 88
E. 48

CP Chemistry

1st Semester Practice Exam KEY

1. B
2. C
3. B
4. D
5. A
6. C
7. B
8. E
9. E
10. C
11. A
12. D
13. E
14. C
15. A
16. D
17. A
18. A
19. C
20. B
21. A
22. A
23. D
24. A
25. C
26. C
27. B
28. C
29. C
30. C
31. B
32. C
33. B
34. D
35. D
36. E
37. C
38. C
39. E
40. B
41. C
42. C
43. D
44. E
45. A
46. C
47. C
48. A
49. C
50. A
51. A
52. C
53. A
54. A
55. E
56. C
57. D
58. B
59. A
60. D
61. E
62. A
63. A
64. E
65. E
66. D
67. B
68. A
69. A
70. B
71. B
72. A
73. E
74. A
75. A
76. D
77. D
78. A
79. A
80. C
81. A
82. D
83. C
84. B
85. B
86. E
87. C
88. B
89. A
90. D
91. C
92. A
93. C
94. A
95. A
96. B
97. C
98. C
99. E