

Key

Chemistry Final Exam Review

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question.

- B 1. The study of chemicals that, in general, do not contain carbon is traditionally called what type of chemistry?
- | | |
|--------------|---------------|
| a. bio | c. physical |
| b. inorganic | d. analytical |
- B 2. Which of the following is NOT an example of matter?
- | | |
|---------|----------------|
| a. air | c. smoke |
| b. heat | d. water vapor |
- B 3. A golf ball has more mass than a tennis ball because it ____.
- | | |
|-------------------------|---------------------------------------|
| a. takes up more space | c. contains different kinds of matter |
| b. contains more matter | d. has a definite composition |
- C 4. An example of an extensive property of matter is ____.
- | | |
|----------------|-------------|
| a. temperature | c. mass |
| b. pressure | d. hardness |
- D 5. All of the following are physical properties of matter EXCEPT ____.
- | | |
|----------|--------------------|
| a. mass | c. melting point |
| b. color | d. ability to rust |
- B 6. Which state of matter has a definite volume and takes the shape of its container?
- | | |
|-----------|-----------------|
| a. solid | c. gas |
| b. liquid | d. both b and c |
- B 7. Which of the following CANNOT be classified as a substance?
- | | |
|---------------|-------------|
| a. table salt | c. nitrogen |
| b. air | d. gold |
- D 8. Which of the following is a heterogeneous mixture?
- | | |
|---------------|----------|
| a. air | c. steel |
| b. salt water | d. soil |
- C 9. Which of the following is a heterogeneous mixture?
- | | |
|---------------------|--------------------|
| a. vinegar in water | c. oil and vinegar |
| b. milk | d. air |
- D 10. Separating a solid from a liquid by evaporating the liquid is called ____.
- | | |
|-----------------|-----------------|
| a. filtration | c. solution |
| b. condensation | d. distillation |
- D 11. A substance that can be separated into two or more substances only by a chemical change is a(n) ____.
- | | |
|-------------|-------------|
| a. solution | c. mixture |
| b. element | d. compound |
- C 12. The chemical symbol for iron is ____.
- | | |
|-------|-------|
| a. fe | c. Fe |
| b. FE | d. Ir |

- D 13. Which of the following is a chemical property?
 a. color
 b. hardness
 c. freezing point
 d. ability to react with oxygen
- C or B 14. Which of the following is NOT a physical change?
 a. grating cheese
 b. melting cheese
 c. fermenting of cheese
 d. mixing two cheeses in a bowl
- D 15. Which of the following does NOT involve a physical change?
 a. mixing
 b. melting
 c. grinding
 d. decomposing
- C 16. A chemical change occurs when a piece of wood _____.
 a. is split
 b. is painted
 c. decays
 d. is cut
- A 17. When an iron nail is ground into powder, its mass _____.
 a. stays the same
 b. decreases
 c. increases
 d. cannot be determined
- A 18. The expression of 5008 km in scientific notation is _____.
 a. 5.008×10^5 km
 b. 50.08×10^{-4} km
 c. 5.008×10^{-5} km
 d. 5.008×10^4 km
- B 19. The closeness of a measurement to its true value is a measure of its _____.
 a. precision
 b. accuracy
 c. reproducibility
 d. usefulness
- C 20. If the temperature changes by 100 K, by how much does it change in °C?
 a. 0°C
 b. 37°C
 c. 100°C
 d. 273°C
- A 21. What is the density of an object having a mass of 8.0 g and a volume of 25 cm³?
 a. 0.32 g/cm³
 b. 2.0 g/cm³
 c. 3.1 g/cm³
 d. 200 g/cm³
- C 22. As the density of a substance increases, the volume of a given mass of that substance _____.
 a. increases
 b. is not affected
 c. decreases
 d. fluctuates
- A 23. The smallest particle of an element that retains the properties of that element is a(n) _____.
 a. atom
 b. electron
 c. proton
 d. neutron
- B 24. Which of the following is NOT a part of Dalton's atomic theory?
 a. All elements are composed of atoms.
 b. Atoms are always in motion.
 c. Atoms of the same element are identical.
 d. Atoms that combine do so in simple whole-number ratios.
- D 25. Which of the following is true about subatomic particles?
 a. Electrons are negatively charged and are the heaviest subatomic particle.

- b. Protons are positively charged and the lightest subatomic particle.
- c. Neutrons have no charge and are the lightest subatomic particle.
- d. The mass of a neutron nearly equals the mass of a proton.

- C 26. All atoms are ____.
- a. positively charged, with the number of protons exceeding the number of electrons
 - b. negatively charged, with the number of electrons exceeding the number of protons
 - c. neutral, with the number of protons equaling the number of electrons
 - d. neutral, with the number of protons equaling the number of electrons, which is equal to the number of neutrons

- C 27. The particles that are found in the nucleus of an atom are ____.
- a. neutrons and electrons
 - b. electrons only
 - c. protons and neutrons
 - d. protons and electrons

- C 28. As a consequence of the discovery of the nucleus by Rutherford, which model of the atom is thought to be true?
- a. Protons, electrons, and neutrons are evenly distributed throughout the volume of the atom.
 - b. The nucleus is made of protons, electrons, and neutrons.
 - c. Electrons are distributed around the nucleus and occupy almost all the volume of the atom.
 - d. The nucleus is made of electrons and protons.

- A 29. The nucleus of an atom is ____.
- a. the central core and is composed of protons and neutrons
 - b. positively charged and has more protons than neutrons
 - c. negatively charged and has a high density
 - d. negatively charged and has a low density

- B 30. The atomic number of an element is the total number of which particles in the nucleus?
- a. neutrons
 - b. protons
 - c. electrons
 - d. protons and electrons

- D 31. An element has an atomic number of 76. The number of protons and electrons in a neutral atom of the element are ____.
- a. 152 protons and 76 electrons
 - b. 76 protons and 0 electrons
 - c. 38 protons and 38 electrons
 - d. 76 protons and 76 electrons

- *D C 32. The sum of the protons and neutrons in an atom equals the ____.
- a. atomic number
 - b. nucleus number
 - c. atomic mass
 - d. mass number

- B 33. What does the number 84 in the name krypton-84 represent?
- a. the atomic number
 - b. the mass number
 - c. the sum of the protons and electrons
 - d. twice the number of protons

- B 34. All atoms of the same element have the same ____.
- a. number of neutrons
 - b. number of protons
 - c. mass numbers
 - d. mass

- A 35. Isotopes of the same element have different ____.
- a. numbers of neutrons
 - b. numbers of protons
 - c. numbers of electrons
 - d. atomic numbers

- B 36. The mass number of an element is equal to ____.

- a. the total number of electrons in the nucleus
- b. the total number of protons and neutrons in the nucleus
- c. less than twice the atomic number
- d. a constant number for the lighter elements

C 37. Which of the following sets of symbols represents isotopes of the same element?

- a. ${}_{42}^{91}\text{J}$ ${}_{42}^{92}\text{J}$ ${}_{40}^{93}\text{J}$
- b. ${}_{19}^{50}\text{L}$ ${}_{20}^{50}\text{L}$ ${}_{21}^{50}\text{L}$
- c. ${}_{38}^{84}\text{M}$ ${}_{38}^{86}\text{M}$ ${}_{38}^{87}\text{M}$
- d. ${}_{59}^{138}\text{Q}$ ${}_{55}^{133}\text{Q}$ ${}_{54}^{133}\text{Q}$

D 38. In which of the following is the number of neutrons correctly represented?

- a. ${}_{9}^{19}\text{F}$ has 0 neutrons.
- b. ${}_{33}^{75}\text{As}$ has 108 neutrons.
- c. ${}_{12}^{24}\text{Mg}$ has 24 neutrons.
- d. ${}_{92}^{238}\text{U}$ has 146 neutrons.

A 39. What unit is used to measure weighted average atomic mass?

- a. amu
- b. gram
- c. angstrom
- d. nanogram

AC 40. In the Bohr model of the atom, an electron in an orbit has a fixed ____.

- a. position
- b. color
- c. energy
- d. size

A 41. How does the energy of an electron change when the electron moves closer to the nucleus?

- a. It decreases.
- b. It increases.
- c. It stays the same.
- d. It doubles.

B 42. What is the shape of the $3p$ atomic orbital?

- a. sphere
- b. dumbbell
- c. bar
- d. two perpendicular dumbbells

B 43. How many energy sublevels are in the second principal energy level?

- a. 1
- b. 2
- c. 3
- d. 4

D 44. What is the maximum number of d orbitals in a principal energy level?

- a. 1
- b. 2
- c. 3
- d. 5

A 45. The shape (not the size) of an electron cloud is determined by the electron's ____.

- a. energy sublevel
- b. position
- c. speed
- d. principal quantum number

B 46. The letter " p " in the symbol $4p^3$ indicates the ____.

- a. spin of an electron
- b. orbital shape
- c. principle energy level
- d. speed of an electron

D 47. What is the next atomic orbital in the series $1s, 2s, 2p, 3s, 3p$?

- a. $2d$
- b. $3d$
- c. $3f$
- d. $4s$

D 48. According to the aufbau principle, ____.

- a. an orbital may be occupied by only two electrons
- b. electrons in the same orbital must have opposite spins

- c. electrons enter orbitals of highest energy first
- d. electrons enter orbitals of lowest energy first

D 49. What is the electron configuration of potassium?

- a. $1s^2 2s^2 2p^2 3s^2 3p^2 4s^1$
- b. $1s^2 2s^2 2p^{10} 3s^2 3p^3$
- c. $1s^2 2s^2 3s^2 3p^6 3d^1$
- d. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$

C 50. How many unpaired electrons are in a sulfur atom (atomic number 16)?

- a. 0
- b. 1
- c. 2
- d. 3

BC 51. How does the speed of visible light compare with the speed of gamma rays, when both speeds are measured in a vacuum?

- a. The speed of visible light is greater.
- b. The speed of gamma rays is greater.
- c. The speeds are the same.
- d. No answer can be determined from the information given.

D 52. Which color of visible light has the shortest wavelength?

- a. yellow
- b. green
- c. blue
- d. violet

D 53. Which of the following electromagnetic waves have the highest frequencies?

- a. ultraviolet light waves
- b. X-rays
- c. microwaves
- d. gamma rays

D 54. Which type of electromagnetic radiation includes the wavelength 10^{-7} m?

- a. gamma ray
- b. microwave
- c. radio wave
- d. visible light

A 55. How are the frequency and wavelength of light related?

- a. They are inversely proportional to each other.
- b. Frequency equals wavelength divided by the speed of light.
- c. Wavelength is determined by dividing frequency by the speed of light.
- d. They are directly proportional to each other.

B 56. The light given off by an electric discharge through sodium vapor is _____.

- a. a continuous spectrum
- b. an emission spectrum
- c. of a single wavelength
- d. white light

B 57. Which scientist developed the quantum mechanical model of the atom?

- a. Albert Einstein
- b. Erwin Schrodinger
- c. Niels Bohr
- d. Ernest Rutherford

D 58. According to the Heisenberg uncertainty principle, if the position of a moving particle is known, what other quantity CANNOT be known?

- a. mass
- b. charge
- c. spin
- d. velocity

A 59. What is another name for the representative elements?

- a. Group A elements
- b. Group B elements
- c. Group C elements
- d. transition elements

$$\Delta T_f = i K_f m$$

- C 60. *What is another name for the transition metals?
- noble gases
 - Group A elements
 - Group B elements
 - Group C elements
- B 61. Which of the following elements is in the same period as phosphorus?
- carbon
 - magnesium
 - nitrogen
 - oxygen
- A 62. Each period in the periodic table corresponds to ____.
- a principal energy level
 - an energy sublevel
 - an orbital
 - a suborbital
- C 63. The modern periodic table is arranged in order of increasing atomic ____.
- mass
 - charge
 - number
 - radius
- D 64. Of the elements Pt, V, Li, and Kr, which is a nonmetal?
- Pt
 - V
 - Li
 - Kr
- C 65. To what category of elements does an element belong if it is a poor conductor of electricity?
- transition elements
 - metalloids
 - nonmetals
 - metals
- C 66. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^2$?
- nitrogen
 - selenium
 - silicon
 - silver
- A 67. Elements that are characterized by the filling of p orbitals are classified as ____.
- groups 3A through 8A
 - transition metals
 - inner transition metals
 - groups 1A and 2A
- B 68. Which subatomic particle plays the greatest part in determining the properties of an element?
- proton
 - electron
 - neutron
 - none of the above
- B 69. Which of the following elements is a transition metal?
- cesium
 - copper
 - tellurium
 - tin
- C 70. Which of the following groupings contains only representative elements?
- Cu, Co, Cd
 - Ni, Fe, Zn
 - Al, Mg, Li
 - Hg, Cr, Ag
- B 71. How does atomic radius change from top to bottom in a group in the periodic table?
- It tends to decrease.
 - It tends to increase.
 - It first increases, then decreases.
 - It first decreases, then increases.
- A 72. How does atomic radius change from left to right across a period in the periodic table?
- It tends to decrease.
 - It tends to increase.
 - It first increases, then decreases.
 - It first decreases, then increases.
- D 73. Atomic size generally ____.
- increases as you move from left to right across a period

- b. decreases as you move from top to bottom within a group
- c. remains constant within a period
- d. decreases as you move from left to right across a period

B

74. What element in the second period has the largest atomic radius?
- a. carbon
 - b. lithium
 - c. potassium
 - d. neon

B

75. Which of the following elements has the smallest atomic radius?
- a. sulfur
 - b. chlorine
 - c. selenium
 - d. bromine

A

76. What is the charge of a cation?
- a. a positive charge
 - b. no charge
 - c. a negative charge
 - d. The charge depends on the size of the nucleus.

D

77. The metals in Groups 1A, 2A, and 3A ____.
- a. gain electrons when they form ions
 - b. all form ions with a negative charge
 - c. all have ions with a 1^+ charge
 - d. lose electrons when they form ions

A

78. What is the element with the lowest electronegativity value?
- a. cesium
 - b. helium
 - c. calcium
 - d. fluorine

D

79. What is the element with the highest electronegativity value?
- a. cesium
 - b. helium
 - c. calcium
 - d. fluorine

B

80. What is the energy required to remove an electron from an atom in the gaseous state called?
- a. nuclear energy
 - b. ionization energy
 - c. shielding energy
 - d. electronegative energy

B

81. Compared with the electronegativities of the elements on the left side of a period, the electronegativities of the elements on the right side of the same period tend to be ____.
- a. lower
 - b. higher
 - c. the same
 - d. unpredictable

A

82. Which of the following statements correctly compares the relative size of an ion to its neutral atom?
- a. The radius of an anion is greater than the radius of its neutral atom.
 - b. The radius of an anion is identical to the radius of its neutral atom.
 - c. The radius of a cation is greater than the radius of its neutral atom.
 - d. The radius of a cation is identical to the radius of its neutral atom.

D

83. How many valence electrons are in an atom of phosphorus?
- a. 2
 - b. 3
 - c. 4
 - d. 5

D

84. What is the electron configuration of the gallium ion?
- a. $1s^2 2s^2 2p^6 3s^2 3p^1$
 - b. $1s^2 2s^2 2p^6 3s^2 3p^4 4s^1$
 - c. $1s^2 2s^2 2p^6 3s^2 3p^0 4s^2 4p^0$
 - d. $1s^2 2s^2 2p^6 3s^2 3p^0 3d^{10}$

Everyone gets a point for this one 😊

- A 85. The octet rule states that, in chemical compounds, atoms tend to have ____.
- the electron configuration of a noble gas
 - more protons than electrons
 - eight electrons in their principal energy level
 - more electrons than protons

- D 86. A compound held together by ionic bonds is called a ____.
- diatomic molecule
 - polar compound
 - covalent molecule
 - salt

- D 87. What is the formula unit of aluminum oxide?
- AlO
 - Al₃O
 - AlO₃
 - Al₂O₃

- A 88. Which of the following is true about the melting temperature of potassium chloride?
- The melting temperature is relatively high.
 - The melting temperature is variable and unpredictable.
 - The melting temperature is relatively low.
 - Potassium chloride does not melt.

- B 89. Which of the following is NOT a characteristic of most ionic compounds?
- They are solids.
 - They have low melting points.
 - When melted, they conduct an electric current.
 - They are composed of metallic and nonmetallic elements.

- A 90. Which of these elements does not exist as a diatomic molecule?
- Ne
 - F
 - H
 - I

- B 91. Why do atoms share electrons in covalent bonds?
- to become ions and attract each other
 - to attain a noble-gas electron configuration
 - to become more polar
 - to increase their atomic numbers

- D 92. Which of the following is the name given to the pairs of valence electrons that do not participate in bonding in diatomic oxygen molecules?
- unvalenced pair
 - outer pair
 - inner pair
 - unshared pair *lone pair*

- A 93. Which of the following diatomic molecules is joined by a double covalent bond?
- O₂
 - Cl₂
 - N₂
 - He₂

- C 94. When one atom contributes both bonding electrons in a single covalent bond, the bond is called a(n) ____.
- one-sided covalent bond
 - unequal covalent bond
 - coordinate covalent bond
 - ionic covalent bond

- D 95. A bond formed between a silicon atom and an oxygen atom is likely to be ____.
- ionic
 - coordinate covalent
 - polar covalent
 - nonpolar covalent

- A 96. Which of the following covalent bonds is the most polar?
a. H—F
b. H—C
c. H—H
d. H—N
- A 97. When placed between oppositely charged metal plates, the region of a water molecule attracted to the negative plate is the _____.
a. hydrogen region of the molecule
b. geometric center of the molecule
c. H—O—H plane of the molecule
d. oxygen region of the molecule
- B 98. What type of ions have names ending in *-ide*?
a. only cations
b. only anions
c. only metal ions
d. only gaseous ions
- C 99. When naming a transition metal ion that can have more than one common ionic charge, the numerical value of the charge is indicated by a _____.
a. prefix
b. suffix
c. Roman numeral following the name
d. superscript after the name
- D 100. An *-ate* or *-ite* at the end of a compound name usually indicates that the compound contains _____.
a. fewer electrons than protons
b. neutral molecules
c. only two elements
d. a polyatomic anion
- C 101. Which of the following compounds contains the Mn^{3+} ion?
a. MnS
b. $MnBr_2$
c. Mn_2O_3
d. MnO
- A 102. How are chemical formulas of binary ionic compounds generally written?
a. cation on left, anion on right
b. anion on left, cation on right
c. Roman numeral first, then anion, then cation
d. subscripts first, then ions
- B 103. Which of the following formulas represents an ionic compound?
a. CS_2
b. BaI_2
c. N_2O_4
d. PCl_3
- A 104. Which element, when combined with fluorine, would most likely form an ionic compound?
a. lithium
b. carbon
c. phosphorus
d. chlorine
- A 105. Which of the following compounds contains the lead(II) ion?
a. PbO
b. $PbCl_4$
c. Pb_2O
d. Pb_2S
- C 106. What is the correct formula for potassium sulfite?
a. $KHSO_3$
b. $KHSO_4$
c. K_2SO_3
d. K_2SO_4
- C 107. Sulfur hexafluoride is an example of a _____.
a. monatomic ion
b. polyatomic ion
c. binary compound
d. polyatomic compound

- C 108. In naming a binary molecular compound, the number of atoms of each element present in the molecule is indicated by ____.
- Roman numerals
 - superscripts
 - prefixes
 - suffixes
- C 109. When dissolved in water, acids produce ____.
- negative ions
 - polyatomic ions
 - hydrogen ions
 - oxide ions
- A 110. When naming acids, the prefix *hydro-* is used when the name of the acid anion ends in ____.
- ide*
 - ite*
 - ate*
 - ic*
- A 111. When the name of an anion that is part of an acid ends in *-ite*, the acid name includes the suffix ____.
- ous*
 - ic*
 - ate*
 - ite*
- B 112. What is the formula for phosphoric acid?
- H_2PO_3
 - H_3PO_4
 - HPO_2
 - HPO_4
- B 113. Suppose you encounter a chemical formula with H as the cation. What do you know about this compound immediately?
- It is a polyatomic ionic compound.
 - It is an acid.
 - It is a base.
 - It has a +1 charge.
- A 114. What does an *-ite* or *-ate* ending in a polyatomic ion mean?
- Oxygen is in the formula.
 - Sulfur is in the formula.
 - Nitrogen is in the formula.
 - Bromine is in the formula.
- D 115. What SI unit is used to measure the number of representative particles in a substance?
- kilogram
 - ampere
 - kelvin
 - mole
- D 116. Avogadro's number of representative particles is equal to one ____.
- kilogram
 - gram
 - kelvin
 - mole
- D 117. How many molecules are in 2.10 mol CO_2 ?
- 2.53×10^{24} molecules
 - 3.79×10^{24} molecules
 - 3.49×10^{24} molecules
 - 1.26×10^{24} molecules
- A 118. The atomic masses of any two elements contain the same number of ____.
- atoms
 - grams
 - ions
 - milliliters
- C 119. What is the molar mass of $(\text{NH}_4)_2\text{CO}_3$?
- 144 g
 - 138 g
 - 96 g
 - 78 g
- D 120. What is the mass in grams of 5.90 mol C_8H_{18} ?
- 0.0512 g
 - 389 g

b. 19.4 g

d. 673 g

C 121. What is the number of moles in 432 g $\text{Ba}(\text{NO}_3)_2$?

a. 0.237 mol

c. 1.65 mol

b. 0.605 mol

d. 3.66 mol

A 122. The volume of one mole of a substance is 22.4 L at STP for all ____.

a. gases

c. solids

b. liquids

d. compounds

A 123. The molar volume of a gas at STP occupies ____.

a. 22.4 L

c. 1 kilopascal

b. 0°C

d. 12 grams

B 124. What is the volume, in liters, of 0.500 mol of C_3H_8 gas at STP?

a. 0.0335 L

c. 16.8 L

b. 11.2 L

d. 22.4 L

C 125. If the density of a noble gas is 1.783 g/L at STP, that gas is ____.

a. Kr

c. Ar

b. Xe

d. He

C 126. If 60.2 grams of Hg combines completely with 24.0 grams of Br to form a compound, what is the percent composition of Hg in the compound?

a. 28.5%

c. 71.5%

b. 39.9%

d. 60.1%

B 127. What is the percent by mass of carbon in acetone, $\text{C}_3\text{H}_6\text{O}$?

a. 20.7%

c. 1.61%

b. 62.1%

d. 30.0%

A 128. The lowest whole-number ratio of the elements in a compound is called the ____.

a. empirical formula

c. binary formula

b. molecular formula

d. representative formula

C 129. What is the empirical formula of a compound that is 40% sulfur and 60% oxygen by weight?

a. SO

c. SO_3

b. SO_2

d. S_6O_4

A 130. What does the symbol Δ in a chemical equation mean?

a. Heat is supplied to the reaction.

c. yields

b. A catalyst is needed.

d. precipitate

C 131. In the chemical equation $\text{H}_2\text{O}_2(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$, the O_2 is a ____.

a. catalyst

c. product

b. solid

d. reactant

D 132. This symbol (\rightleftharpoons) indicates that ____.

a. heat must be applied

b. an incomplete combustion reaction has occurred

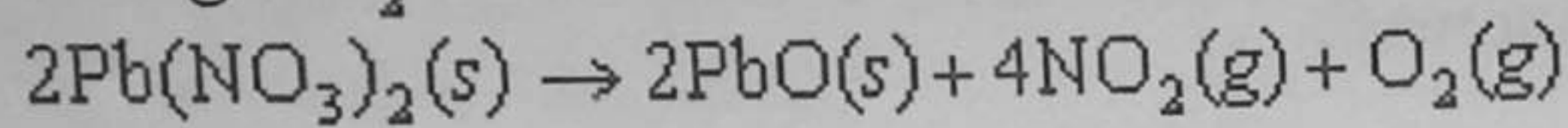
c. a gas is formed by the reaction

d. the reaction is reversible

- A 133. What are the coefficients that will balance the skeleton equation below?
 $\text{AlCl}_3 + \text{NaOH} \rightarrow \text{Al(OH)}_3 + \text{NaCl}$
a. 1, 3, 1, 3
b. 3, 1, 3, 1
c. 1, 1, 1, 3
d. 1, 3, 3, 1
- C 134. When the equation $\text{Fe} + \text{Cl}_2 \rightarrow \text{FeCl}_3$ is balanced, what is the coefficient for Cl_2 ?
a. 1
b. 2
c. 3
d. 4
- C 135. Chemical equations must be balanced to satisfy _____.
a. the law of definite proportions
b. the law of multiple proportions
c. the law of conservation of mass
d. Avogadro's principle
- A 136. In every balanced chemical equation, each side of the equation has the same number of _____.
a. atoms of each element
b. molecules
c. moles
d. coefficients
- D 137. What are the missing coefficients for the skeleton equation below?
 $\text{Al}_2(\text{SO}_4)_3(\text{aq}) + \text{KOH}(\text{aq}) \rightarrow \text{Al(OH)}_3(\text{aq}) + \text{K}_2\text{SO}_4(\text{aq})$
a. 1, 3, 2, 3
b. 2, 12, 4, 6
c. 4, 6, 2, 3
d. 1, 6, 2, 3
- C 138. The type of reaction that takes place when one element reacts with a compound to form a new compound and a different element is a _____.
a. combination reaction
b. decomposition reaction
c. single-replacement reaction
d. double-replacement reaction
- B 139. Which of the following is a balanced equation representing the decomposition of lead(IV) oxide?
a. $\text{PbO}_2 \rightarrow \text{Pb} + 2\text{O}$
b. $\text{PbO}_2 \rightarrow \text{Pb} + \text{O}_2$
c. $\text{Pb}_2\text{O} \rightarrow 2\text{Pb} + \text{O}$
d. $\text{PbO} \rightarrow \text{Pb} + \text{O}_2$
- A 140. In the activity series of metals, which metal(s) will displace hydrogen from an acid?
a. only metals above hydrogen
b. only metals below hydrogen
c. any metal
d. only metals from Li to Na
- D 141. If a combination reaction takes place between rubidium and bromine, the chemical formula for the product is _____.
a. RuBr
b. Rb_2Br
c. RbBr_2
d. RbBr
- A 142. The calculation of quantities in chemical equations is called _____.
a. stoichiometry
b. dimensional analysis
c. percent composition
d. percent yield
- B 143. How many moles of aluminum are needed to react completely with 1.2 mol of FeO ?
 $2\text{Al}(s) + 3\text{FeO}(s) \rightarrow 3\text{Fe}(s) + \text{Al}_2\text{O}_3(s)$
a. 1.2 mol
b. 0.8 mol
c. 1.6 mol
d. 2.4 mol
- D 144. Hydrogen gas can be produced by reacting aluminum with sulfuric acid. How many moles of sulfuric acid are needed to completely react with 15.0 mol of aluminum?
 $2\text{Al}(s) + 3\text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{Al}_2(\text{SO}_4)_3(\text{aq}) + 3\text{H}_2(\text{g})$

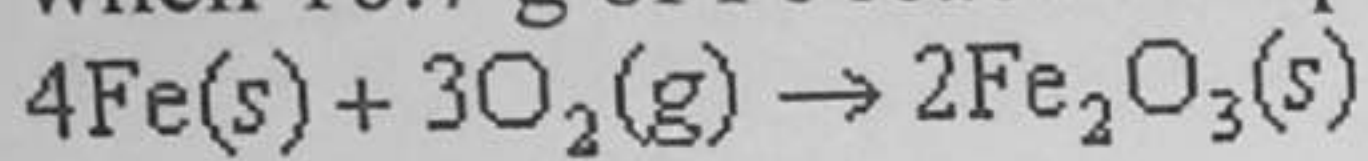
- a. 0.100 mol
- b. 10.0 mol
- c. 15.0 mol
- d. 22.5 mol

B 145. The equation below shows the decomposition of lead nitrate. How many grams of oxygen are produced when 11.5 g NO_2 is formed?



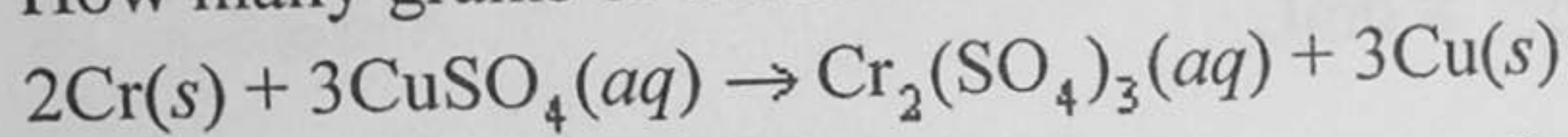
- a. 1.00 g
- b. 2.00 g
- c. 2.88 g
- d. 32.0 g

B 146. Iron(III) oxide is formed when iron combines with oxygen in the air. How many grams of Fe_2O_3 are formed when 16.7 g of Fe reacts completely with oxygen?



- a. 12.0 g
- b. 23.9 g
- c. 47.8 g
- d. 95.6 g

A 147. How many grams of chromium are needed to react with an excess of CuSO_4 to produce 27.0 g Cu?



- a. 14.7 g
- b. 18.0 g
- c. 33.2 g
- d. 81.5 g

C 148. When an equation is used to calculate the amount of product that will form during a reaction, then the value obtained is called the ____.

- a. actual yield
- b. percent yield
- c. theoretical yield
- d. minimum yield

A 149. How does the gas propellant move when an aerosol can is used?

- a. from a region of high pressure to a region of lower pressure
- b. from a region of high pressure to a region of equally high pressure
- c. from a region of low pressure to a region of higher pressure
- d. from a region of low pressure to a region of equally low pressure

A 150. What happens to the temperature of a gas when it is compressed?

- a. The temperature increases.
- b. The temperature does not change.
- c. The temperature decreases.
- d. The temperature becomes unpredictable.

$$\frac{P_1 V_1}{T_1} = \frac{P_2 \uparrow V_2 \downarrow}{T_2}$$

A 151. When the Kelvin temperature of an enclosed gas doubles, the particles of the gas ____.

- a. move faster
- b. strike the walls of the container with less force
- c. decrease in average kinetic energy
- d. decrease in volume

A 152. Boyle's law states that ____.

- a. the volume of a gas varies inversely with pressure
- b. the volume of a gas varies directly with pressure
- c. the temperature of a gas varies inversely with pressure
- d. the temperature of a gas varies directly with pressure

B 153. Charles's law states that ____.

- a. the pressure of a gas is inversely proportional to its temperature in kelvins
- b. the volume of a gas is directly proportional to its temperature in kelvins

- c. the pressure of a gas is directly proportional to its temperature in kelvins
- d. the volume of a gas is inversely proportional to its temperature in kelvins

D 154. As the temperature of a fixed volume of a gas increases, the pressure will ____.

- a. vary inversely
- b. decrease
- c. not change
- d. increase

A 155. If a sealed syringe is plunged into cold water, in which direction will the syringe piston slide?

- a. in
- b. out
- c. No movement will occur.
- d. The direction cannot be predicted.

D 156. A gas occupies a volume of 2.4 L at 14.1 kPa. What volume will the gas occupy at 84.6 kPa?

- a. 497 L
- b. 2.5 L
- c. 14 L
- d. 0.40 L

C 157. A sample of gas occupies 17 mL at -112°C . What volume does the sample occupy at 70°C ?

- a. 10.6 mL
- b. 27 mL
- c. 36 mL
- d. 8.0 mL

A 158. At high pressures, how does the volume of a real gas compare with the volume of an ideal gas under the same conditions?

- a. It is much greater.
- b. It is much less.
- c. There is no difference.
- d. It depends on the type of gas.

B 159. Under what conditions of temperature and pressure is the behavior of real gases most like that of ideal gases?

- a. low temperature and low pressure
- b. low temperature and high pressure
- c. high temperature and low pressure
- d. high temperature and high pressure

C 160. A breathing mixture used by deep-sea divers contains helium, oxygen, and carbon dioxide. What is the partial pressure of oxygen at 101.4 kPa if $P_{\text{He}} = 82.5 \text{ kPa}$ and $P_{\text{CO}_2} = 0.4 \text{ kPa}$?

- a. 82.9 kPa
- b. 19.3 kPa
- c. 18.5 kPa
- d. 101.0 kPa

D 161. The tendency of molecules to move toward areas of lower concentration is called ____.

- a. suffusion
- b. suspension
- c. effusion
- d. diffusion

D 162. Which of the following gases will effuse the most rapidly?

- a. bromine
- b. chlorine
- c. ammonia
- d. hydrogen

D 163. If a crystal added to an aqueous solution causes many particles to come out of the solution, the original solution was ____.

- a. unsaturated
- b. saturated
- c. an emulsion
- d. supersaturated

B 164. Which of the following occurs as temperature increases?

- a. Solubility decreases.
- b. Solubility increases.
- c. Solubility remains the same.
- d. Molarity doubles.

D 165. What is the molarity of a solution that contains 6 moles of solute in 2 liters of solution?

- a. 6M
- b. 12M
- c. 7M
- d. 3M

166. What is the molarity of a solution containing 7.0 moles of solute in 569 mL of solution?

- a. 81M
- b. 0.081M
- c. 12M
- d. 4.0M

167. If an atom is reduced in a redox reaction, what must happen to another atom in the system?

- a. It must be oxidized.
- b. It must be reduced.
- c. It must be neutralized.
- d. Nothing needs to happen to another atom in the system.

168. What is another name for an oxidation-reduction reaction?

- a. O-reaction
- b. R-reaction
- c. redox reaction
- d. oxred reaction

169. In which of the following types of reaction are electrons gained?

- a. decomposition
- b. oxidation
- c. neutralization
- d. reduction

170. Oxidation is ____.

- a. a loss of oxygen
- b. a gain of electrons
- c. a loss of electrons
- d. a gain of hydrogen

171. $\text{Cu} \rightarrow \text{Cu}^{2+} + 2\text{e}^-$

The equation above represents the type of reaction called ____.

- a. redox
- b. hydrolysis
- c. reduction
- d. oxidation

172. Which type of reaction does $\text{Sn}^{2+} \rightarrow \text{Sn}^{4+}$ represent?

- a. oxidation
- b. reduction
- c. hydrolysis
- d. none of the above

173. The oxidation number of magnesium in magnesium chloride is ____.

- a. -1
- b. 0
- c. +1
- d. +2

174. The oxidation number of hydrogen when it is in a compound other than a hydride is ____.

- a. -2
- b. -1
- c. 0
- d. +1

175. The oxidation number of bromine in bromine gas is ____.

- a. -2
- b. -1
- c. 0
- d. +1