Chemistry Challenge Practice Exam #2

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

____ 1. How many atoms are in 0.075 mol of titanium?

a. 1.2×10^{-25}
b. 2.2×10^{24}
c. 6.4×10^{2}
d. 4.5×10^{22}

____ 2. How many molecules are in 2.10 mol CO_2?

a. 2.53×10^{24} molecules
b. 3.79×10^{24} molecules
c. 3.49×10^{-24} molecules
d. 1.26×10^{24} molecules

____ 3. What is the percent by mass of carbon in acetone, C_3H_6O?

a. 20.7%
b. 62.1%
c. 1.61%
d. 30.0%

____ 4. What is the molar mass of $AuCl_3$?

a. 96 g
b. 130 g
c. 232.5 g
d. 303.6 g

____ 5. What is the name of the ionic compound formed from lithium and bromine?

a. lithium bromine
b. lithium bromide
c. lithium bromium
d. lithium bromate

____ 6. What is the electron configuration of the gallium ion?

a. $1s^2 2s^2 2p^6 3s^2 3p^6$
b. $1s^2 2s^2 2p^6 3s^2 3p^5 4s^1$
c. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 4p^6$
d. $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10}$

____ 7. What is the formula unit of sodium nitride?

a. NaN
b. Na_2N
c. Na_3N
d. NaN_3

____ 8. Which elements can form diatomic molecules joined by a single covalent bond?

a. hydrogen only
b. halogens only
c. halogens and members of the oxygen group only
d. hydrogen and the halogens only

____ 9. How are conditions of pressure and temperature, at which one phase exists shown on a phase diagram?
a. by a line separating the phases
b. by the endpoints of the line segment separating the phases
c. by the planar regions between lines in the diagram
d. by the triple points

____ 10. How many valence electrons does a helium atom have?
a. 2
b. 3
c. 4
d. 5

____ 11. How many valence electrons are in a silicon atom?
a. 2
b. 4
c. 6
d. 8

____ 12. In which of the following sets is the symbol of the element, the number of protons, and the number of electrons given correctly?
a. In, 49 protons, 49 electrons
b. Zn, 30 protons, 60 electrons
c. Cs, 55 protons, 132.9 electrons
d. F, 19 protons, 19 electrons

____ 13. How many protons, electrons, and neutrons does an atom with atomic number 50 and mass number 125 contain?
a. 50 protons, 50 electrons, 75 neutrons
b. 75 electrons, 50 protons, 50 neutrons
c. 120 neutrons, 50 protons, 75 electrons
d. 70 neutrons, 75 protons, 50 electrons

____ 14. 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?
$2Al(s) + 3H_2SO_4(aq) \rightarrow Al_2(SO_4)_3(aq) + 3H_2(g)$
a. 0.100 mol
b. 10.0 mol
c. 15.0 mol
d. 22.5 mol

____ 15. How many liters of hydrogen gas are needed to react with CS_2 to produce 2.50 L of CH_4 at STP?
$4H_2(g)+CS_2(l) \rightarrow CH_4(g) + 2H_2S(g)$
a. 2.50 L
b. 5.00 L
c. 7.50 L
d. 10.0 L

____ 16. If you rewrite the following word equation as a balanced chemical equation, what will the coefficient and symbol for fluorine be?
nitrogen trifluoride $\rightarrow$ nitrogen + fluorine
a. $6F_2$
b. F_3
c. 6F
d. $3F_2$

____ 17. 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

____ 18. What are the missing coefficients for the skeleton equation below?

$Al_2(SO_4)_3(aq) + KOH(aq) \rightarrow Al(OH)_3(aq) + K_2SO_4(aq)$

a. 1, 3, 2, 3
b. 2, 12, 4, 6
c. 4, 6, 2, 3
d. 1, 6, 2, 3

____ 19. 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.

____ 20. Which element, when combined with fluorine, would most likely form an ionic compound?

a. lithium
b. carbon
c. phosphorus
d. chlorine

____ 21. Which of the following is a binary molecular compound?

a. $BeHCO_3$
b. PCl_5
c. AgI
d. MgS

____ 22. What element has the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^2$?

a. nitrogen
b. selenium
c. silicon
d. silver

____ 23. Which of the following factors contributes to the decrease in ionization energy within a group in the periodic table as the atomic number increases?

a. increase in atomic size
b. increase in size of the nucleus
c. increase in number of protons
d. fewer electrons in the highest occupied energy level

____ 24. Of the following elements, which one has the smallest first ionization energy?

a. boron
b. carbon
c. aluminum
d. silicon

____ 25. To what category of elements does an element belong if it is a poor conductor of electricity?

a. transition elements
b. metalloids
c. nonmetals
d. metals

____ 26. How does atomic radius change from top to bottom in a group in the periodic table?

a. It tends to decrease.
b. It tends to increase.
c. It first increases, then decreases.
d. It first decreases, then increases.

____ 27. What is the number of chloride ions (Cl-) in 250 mL of a 0.2*M* magnesium chloride solution?

a. 0.1 mol
b. 0.16 mol
c. 0.62 mol
d. 1.6 mol

____ 28. What mass of sucrose, $C_{12}H_{22}O_{11}$, is needed to make 500.0 mL of a 0.200*M* solution?

a. 34.2 g
b. 100 g
c. 17.1 g
d. 68.4 g

____ 29. The volume of 6.00*M* HCl needed to make 319 mL of 6.80*M* HCl is ____.

a. 0.128 mL
b. 7.8 mL
c. 281 mL
d. 362 mL

____ 30. What is the best description for a solution with a hydroxide-ion concentration of $1 \times 10^{-4} M$?

a. acidic
b. basic
c. neutral
d. The answer cannot be determined.

____ 31. Which of the following compounds is an electrolyte?

a. rubbing alcohol
b. sugar
c. carbon tetrachloride
d. sodium hydroxide

____ 32. Why does a higher concentration make a reaction faster?

a. There are more collisions per second only.
b. Collisions occur with greater energy only.
c. There are more collisions per second and the collisions are of greater energy.
d. There are more collisions per second or the collisions are of greater energy.

____ 33. What is the measurement 1042 L rounded off to two significant digits?

a. 1.0×10^3 L
b. 1040 L
c. 1050 L
d. 1.1×10^3 L

____ 34. Express the sum of 1111 km and 222 km using the correct number of significant digits.

a. 1300 km
b. 1330 km
c. 1333 km
d. 1333.0 km

____ 35. 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

____ 36. A molecule with a single and a double covalent bond is ____.

a. CO_2
b. O_3
c. H_2S
d. CS_2

____ 37. What volume, in liters, of 0.40 M NaCl solution contains 0.10 moles of NaCl

a. 0.040
b. 0.10
c. 0.25
d. 0.40

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Answer Section

MULTIPLE CHOICE

1. D
2. D
3. B
4. D
5. B
6. D
7. C
8. D
9. B
10. A
11. B
12. A
13. A
14. D
15. D
16. D
17. A
18. D
19. A
20. A
21. B
22. C
23. A
24. C
25. C
26. B
27. A
28. A
29. D
30. B
31. D
32. A
33. A
34. C
35. D
36. B
37. C