Name: _____ **Class:** _____ **Date:** _____

Chemistry Final Exam 2018-2019

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

____ 1. **Ch. 3b**

Which coefficients correctly balance the formula equation $CaO + H_2O \rightarrow Ca(OH)_2$?

a. 1, 1, 1
b. 2, 1, 2
c. 1, 2, 1
d. 1, 2, 3

____ 2. **Ch. 3a**

What is the name of the compound whose formula is $FeCO_3$?

a. iron (III) carbon trioxide
b. iron (I) carbonate
c. iron carbonate
d. iron (II) carbonate

____ 3. **Ch. 5b**

A gas has a volume of 50.0 cm^3 at a temperature of -73°C. What volume would the gas occupy at a temperature of -123°C if the pressure stays constant?

a. 5.0 cm^3
b. 37.5 cm^3
c. 50.0 cm^3
d. 3.75 cm^3

____ 4. **Ch. 5e**

The energy required to melt a solid into a liquid is called —

a. triple point
b. heat of fusion
c. cooling curve
d. heat of vaporization

Name: _____

_____ 5. **Ch. 3f**

Le Chatelier's principle describes what happens to a system in equilibrium when a stress occurs. All of the following could shift an equilibrium EXCEPT—

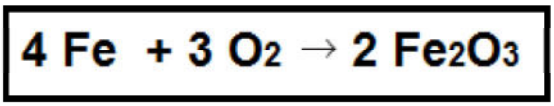
a. changing the concentration of one of the components
b. changing the identity of the catalyst
c. changing the pressure on the system
d. changing the temperature of the system

_____ 6. **Ch. 5d**

If substance X is a liquid, substance Y is a gas, and substance Z is a solid, and all are at the same temperature and pressure, then the order of increasing strength of their intermolecular forces would be —

a. Y < Z < X
b. Y < X < Z
c. Z < Y < X
d. X < Y < Z

_____ 7. **Ch. 3e**



Which type of reaction is represent above?

a. synthesis
b. single replacement
c. double replacement
d. decomposition

_____ 8. **Ch. 5a**

One of the main assumptions of the kinetic molecular theory of gases is that the particles of an ideal gas —

a. must be maintained at very high pressures
b. must be highly chemically reactive
c. are in rapid, random, constant motion
d. must be single atoms instead of molecules

Name: _____

_____ 9. **Ch. 3c**

The type of formula that shows the arrangements of atoms and bonds is called —

a. molecular
b. empirical
c. structural
d. chemical

_____ 10. **Ch. 5a**

The average kinetic energy of a sample of water molecules is —

a. always equal to zero
b. unaffected by temperature changes
c. increased as the temperature is increased
d. increased as the temperature is decreased

_____ 11. **Ch. 1i**

Using the scientific method, information obtained through one's senses is called a(n)

a. experiment
b. hypothesis
c. theory
d. obsevation

_____ 12. **Ch. 2h**

Which of the following does NOT involve a physical change?

a. decomposing
b. mixing
c. melting
d. grinding

_____ 13. **Ch. 2i**

Neils Bohr's contribution to modern atomic theory was the proposition that-

a. atomic mass is determined by the number of protons and neutrons in an atom
b. electrons have a definite mass that can be computed
c. each atom has a specific number of positive charges
d. an atom has electrons in discrete energy levels

Name: _____

____ 14. **Chem. 1a**

A piece of glassware has a narrow neck and wide base. It is used for heating and mixing so that the contents do not spill out easily. What is the name of this glassware?

a. buret
b. beaker
c. evaporating dish
d. Erlenmeyer flask

____ 15. **Ch. 2a**

An increase in atomic number is related to an increase in atomic mass because —

a. more electrons are orbiting the atomic nucleus
b. more protons are present in the atomic nucleus
c. more electrons are present in the atomic nucleus
d. more protons are orbiting the atomic nucleus

____ 16. **Ch. 1f**

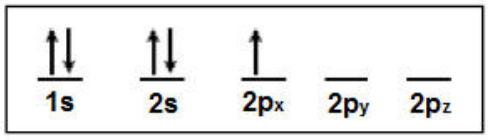
A student measured the temperature of a boiling solution and found it to be 56.0°C at standard pressure. The theoretical temperature of that boiling solution is 55.0°C. What is the percent error in the student's measurement?

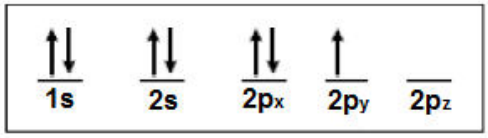
a. 0.18%
b. 1.8%
c. 0.018%
d. 18%

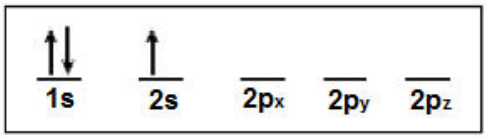
Name: _____

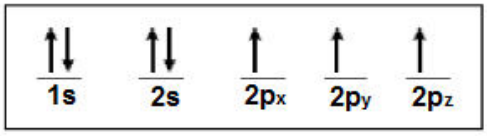
____ 17. **Ch. 2g**

Which of the following orbital diagrams is *incorrect* because it violates Hund's rule?

a. 

b. 

c. 

d. 

____ 18. **Ch. 4a**

A 1.0 mole sample of H_2O_2 weighs?

a. 17 g
b. 1.0 g
c. 18 g
d. 34 g

____ 19. **Ch. 2d**

The elements that are characterized by the presence of an incomplete *d* sublevel are called —

a. lanthanoids
b. halogens
c. transition elements
d. alkali earth metals

____ 20. **Ch. 5e**

If the heat of fusion of water is 80 cal/g, the amount of heat energy required to change 15.0 grams of ice at 0°C to 15.0 grams of water at 0°C is—

a. 1200 cal
b. 560 cal
c. 2400 cal
d. 80 cal

Name: _____

____ 21. **Ch. 4a**

What is the density of oxygen gas at STP?

a. 32.0 g/L
b. 1.43 g/L
c. 7.17×10^2 g/L
d. 22.4 g/L

____ 22. **Ch. 2g**

In HNO_3 the oxidation state of hydrogen is +1 and the oxidation state of oxygen is -2. Therefore, the oxidation state of nitrogen is —

a. +3
b. -1
c. +5
d. +4

____ 23. **Ch. 2h**

Which of the following terms best describes a bowl of sugar?

a. element
b. compound
c. homogeneous mixture
d. heterogeneous mixture

____ 24. **Ch. 2a**

The element chlorine exists as two naturally occurring isotopes. Cl-35 occurs 75% of the time and Cl-37 occurs 25% of the time. Which of the following calculations should be used to calculate the correct average atomic mass of chlorine?

a. $\dfrac{(35\text{ amu} \times 3) + 37\text{ amu}}{2}$

b. $(35\text{ amu} \times .75) + (37\text{ amu} \times .25)$

c. $\dfrac{(35\text{ amu} \times 3) + 37\text{ amu}}{3}$

d. $\dfrac{35\text{ amu} + 37\text{ amu}}{2}$

Name: _____

_____ 25. **Ch. 3c**

A compound is composed of 85.64% carbon and 14.36% hydrogen. The compound has a formula mass of 42.08 grams. What is the molecular formula?

a. C_3H_6
b. CH_2
c. C_2H_{18}
d. C_2H_4

_____ 26. **Ch. 1g**

A compound has a mass of $4.875x10^2$ **g/mol. The number of significant figures in this mass is —**

a. 2
b. 7
c. 5
d. 4

_____ 27. **Ch. 4b**

Consider the reaction : 2 Al + 3 $CuCl_2$ --> 3 Cu + 2 $AlCl_3$
A chemist reacts 5g of aluminum with 37 g of copper (II) chloride. If the reaction produces 17 g of copper, what mass of aluminum chloride is produced?

a. 10 g
b. 8 g
c. 25 g
d. 15 g

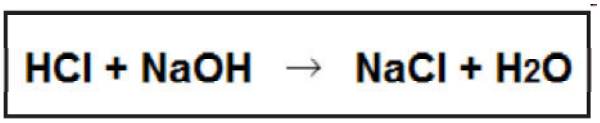
_____ 28. **Ch. 3d**

When carbon and hydrogen combine to form a molecular compound -

a. H gains 1 electron and C loses 4 electrons
b. C gains 4 electrons and H loses 1 electron
c. C and H keep the same number of electrons
d. C and H share electrons

Name: _____

____ 29. **Ch. 3e**



The reaction is which type of chemical reaction?

a. Decomposition
b. Single replacement
c. Neutralization
d. Double replacement

____ 30. **Ch. 1e**

A student measured the density of a liqud three times and recorded the following data.

Trial	**Density, g/ml**
1	**1.37 g/ml**
2	**1.46 g/ml**
3	**1.55 g/ml**

If the actual density of the liquid is 1.45 g, what can be said about the data?

a. High precision, low accuracy
b. Low precision, high accuracy
c. Low precision, low accuracy
d. High precision, high accuracy

____ 31. **Ch. 2h**

All of the following are physical properties of matter EXCEPT:

a. flammability
b. odor
c. density
d. specific heat

____ 32. **Ch. 4c**

What volume of water must be added to 72.0 g HCl to prepare a 0.15 M solution?

a. 0.30 L
b. 10.8 L
c. 13 L
d. 480 L

Name: _____

_____ 33. **Ch. 3e**

Which of these represents a single replacement reaction?

a. $Zn + 2HCl \rightarrow ZnCl_2 + H_2$
b. $2KClO_3 \rightarrow 2KCl + 3O_2$
c. $AgNO_3 + HCl \rightarrow AgCl + HNO_3$
d. $N_2 + 3H_2 \rightarrow 2NH_3$

_____ 34. **Ch. 2f**

At room temperature, chlorine exists as a gas, bromine exists as a liquid, and iodine exists as a solid. The physical states of these elements indicate that melting point —

a. increases from top to bottom within group 17 elements
b. is constant within group 17 elements
c. is independent of periodic position
d. decreases from top to bottom with group 17 elements

_____ 35. **Ch. 1g**

The temperature of 40°C is ___ in Kelvins.

a. -233
b. -173
c. 298
d. 313

_____ 36. **Ch. 4b**

In the reaction $2\ Al + 3\ CuSO_4 \rightarrow Al_2(SO_4)_3 + 3\ Cu$, how many moles of aluminum are required to produce 12 moles of copper?

a. 8
b. 6
c. 4
d. 12

_____ 37. Ch. 2h

A form of matter is found to have a variable proportion of its components and 3 sets of properties. It is uniform throughout. It is most likely a/an:

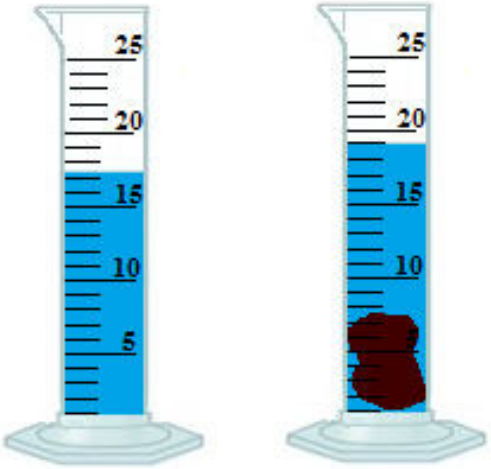
a. element
b. heterogeneous mixture
c. homogeneous mixture
d. compound

Name: _____

____ 38. **Ch. 4a**

What is the molar mass of Na_3PO_4?

a. 118 g/mol
b. 148 g/mol
c. 164 g/mol
d. 58 g/mol



____ 39. **Chem. 1a**

The volume of the object in the graduated cylinder is

a. 17 mL
b. 8 mL
c. 19 mL
d. 2 mL

____ 40. **Ch. 5f**

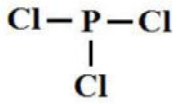
Solid copper has a specific heat of 0.385 J/g°C. How much heat is given off by a 25.0 gram sample of copper when it cools from 37.0°C to 22.0°C.

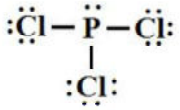
a. -1440 J
b. -144 J
c. -974 J
d. -375 J

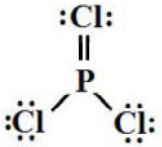
Name: _____

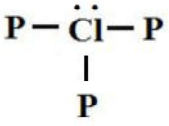
____ 41. **Ch. 3d**

Phosphorus trichloride is a covalent compound. Which is a correct Lewis dot structure for PCl_3?

a. 

b. 

c. 

d. 

____ 42. **Ch. 5d**

What is primarily responsible for the high surface tension, specific heat capacity, boiling point and melting point of water?

a. ionic bonds
b. covalent bonds
c. hydrogen bonds
d. dispersion forces

____ 43. **Ch. 4a**

One mole of carbon dioxide weighs?

a. 44 g
b. 22 g
c. 38 g
d. 16 g

Name: _____

$$NaHCO_3(s) + HCl(aq) \rightarrow NaCl(aq) + CO_2(g) + H_2O(g)$$

Data Table

evaporating dish + watch glass	42.70 g
evaporating dish + watch glass + $NaHCO_3$	45.20 g
evaporating dish + watch glass + NaCl	44.45 g

____ 44. **Chem. 1a**

A student conducted an experiment and was interested in the mass of the product of the chemical reaction. Some results of the experiment are shown above. What is the mass of the NaCl?

a. 0.75 g
b. 2.50 g
c. 1.75 g
d. 2.25 g

____ 45. **Ch. 1g**

Why should the rules of significant figures be utilized when rounding answers to lab calculations?

a. to increase the precision of the student's measurements
b. to increase the accuracy of the lab instruments
c. to decrease the precision of the lab instruments
d. to match the accuracy of the lab instruments

____ 46. **Ch. 1g**

A student massed a peice of iron on a balance. The most sensitive beam was marked off in 0.1 g intervals. The student reported the iron's mass as 12.34 g . Which of the digits in the measurement is estimated?

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

Name: _____

____ 47. **Ch. 3c**

A compound has 30% nitrogen and 70% oxygen. What is its empirical formula?

a. NO_4
b. NO_2
c. N_2O_4
d. NO_3

____ 48. **Ch. 5b**

According to Charles' law, the volume of a fixed amount of gas is directly proportional to —

a. isoelectric mixture
b. kelvin temperature
c. vapor concentration
d. barometric pressure

____ 49. **Ch. 2c**

Elements	Protons	Neutrons	Electrons
1	11	12	10
2	1	0	2
3	15	16	15
4	20	20	18

Which of the above elements is a positive ion with a charge of one?

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

Name: _____

____ 50. **Ch. 3d**

Sulfur is represented by the following Lewis dot structure:

Which of the elements has the same Lewis structure?

a. Chlorine
b. Phosphorus
c. Magnesium
d. Oxygen

____ 51. **Ch. 3c**

The formula for calcium bromide is —

a. CaBr
b. $CaBr_2$
c. Ca_2Br_3
d. CB_2

____ 52. **Ch. 4c**

How many grams of sodium chloride are required to prepare 500.0 mL of a 0.100 M solution?

a. 29.3 g
b. 2.93 g
c. 58.5 g
d. 1.46 g

____ 53. **Ch. 1g**

X	Y
2	4
4	8
6	12
8	16

Using the above data to plot a graph, the graph would...

a. increase going left to right
b. increase then decrease going left to right
c. decrease then increase going left to right
d. decrease going left to right

Name: _____

____ 54. **Ch. 3d**

Which of the following is the correct molecular shape of NH_3?

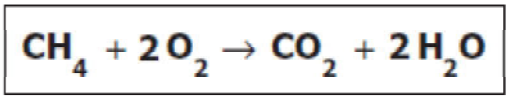
a. Linear
b. Bent
c. Pyramidal
d. Tetrahedral

____ 55. **Ch. 3f**

Which of the following occurs when a reaction in a solution is at equilibrium and more product is added to the solution?

a. Equilibrium shifts to produce more product
b. The reaction will stop
c. Equilibrium shifts to produce more reactant
d. No change will occur

____ 56. **Ch. 4b**



If 3.0 moles of methane react with oxygen to produce carbon dioxide and water, what mass of water is produced?

a. 18 grams
b. 72 grams
c. 54 grams
d. 108 grams

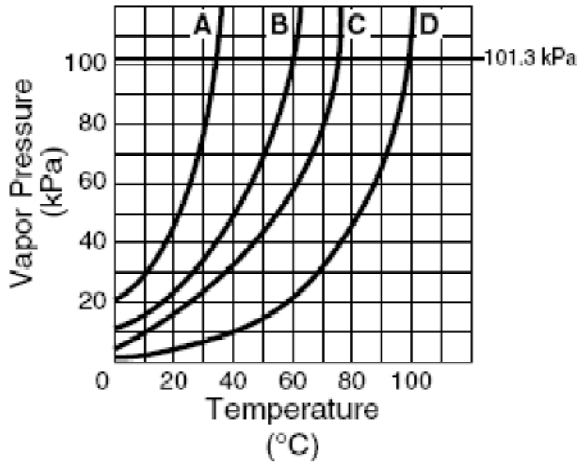
____ 57. **Ch. 6a**

Which substance below is organic?

a. NaOH
b. HCl
c. C_3H_8O
d. Fe_2O_3

Name: _____

____ 58. **Ch. 1g**



Line D represents water. If the atmospheric pressure in a flask is lowered to 70 kPa, water would boil at what temperature?

a. 70°C
b. 100°C
c. 32°C
d. 92°C

____ 59. **Ch. 4a**

What is the mass of a mole of $Mg(NO_3)_2$?

a. 124 grams
b. 148 grams
c. 86 grams
d. 118 grams

____ 60. **Chem. 1a**

For an experiment, 13.2 mL of HCl are needed. What is the best instrument to use for measuring this volume?

a. Graduated cylinder
b. Beaker
c. Test tube
d. Erlenmeyer flask

Chemistry Final Exam 2018-2019
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1 DIF: c REF: 2005 SOL
   OBJ: Chemical Formulas and Reactions STA: Ch. 3b
2. ANS: D PTS: 1 DIF: c OBJ: Chemical Formulas and Reactions
   STA: Ch. 3a
3. ANS: B PTS: 1 DIF: a REF: 2000 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5b
4. ANS: B PTS: 1 DIF: k REF: 2004 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5e
5. ANS: B PTS: 1 DIF: c REF: 2009 SOL
   OBJ: Chemical Formulas and Reactions STA: Ch. 3f
6. ANS: B PTS: 1 DIF: a REF: 2009 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5d
7. ANS: A PTS: 1 DIF: k REF: 2005 SOL
   OBJ: Chemical Formulas and Reactions STA: Ch. 3e
8. ANS: C PTS: 1 DIF: k REF: 2001 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5a
9. ANS: C PTS: 1 DIF: k REF: 2005 SOL
   OBJ: Chemical Formulas and Reactions STA: Ch. 3c
10. ANS: C PTS: 1 DIF: k REF: 2001 SOL
    OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5a
11. ANS: D PTS: 1 DIF: k REF: tjones
    OBJ: Scientific Investigation STA: ch.1i
12. ANS: A PTS: 1 DIF: c
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
13. ANS: D PTS: 1 DIF: c REF: 2000 SOL
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2i
14. ANS: D PTS: 1 DIF: k OBJ: Scientific Investigation
    STA: Ch. 1a
15. ANS: B PTS: 1 DIF: c REF: 2003 SOL
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2a
16. ANS: B PTS: 1 DIF: c REF: 2000 SOL
    OBJ: Scientific Investigation STA: Ch. 1f
17. ANS: B PTS: 1 DIF: c REF: 2004 SOL
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2g
18. ANS: D PTS: 1 DIF: c REF: dbutler
    OBJ: Molar Relationships STA: Ch. 4a MSC: Zumdahl 3rd Edition
19. ANS: C PTS: 1 DIF: k REF: 2005 SOL
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2d
20. ANS: A PTS: 1 DIF: c REF: 2003 SOL
    OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5e
21. ANS: B PTS: 1 DIF: a REF: 2003 SOL
    OBJ: Molar Relationships STA: Ch. 4a

22. ANS: C PTS: 1 DIF: c REF: 2007 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2g
23. ANS: B PTS: 1 DIF: k
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
24. ANS: B PTS: 1 DIF: c REF: 2001 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2a
25. ANS: A PTS: 1 DIF: a REF: 2003 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
26. ANS: D PTS: 1 DIF: k REF: 2007 SOL
OBJ: Scientific Investigation STA: Ch. 1g
27. ANS: C PTS: 1 DIF: c REF: ncook
OBJ: Molar Relationships STA: Ch. 4b MSC: made it up
28. ANS: D PTS: 1 DIF: k REF: ncook
OBJ: Chemical Formulas and Reactions STA: Ch. 3d MSC: made it up
29. ANS: C PTS: 1 DIF: k REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3e
30. ANS: B PTS: 1 DIF: c REF: tjones
OBJ: Scientific Investigation STA: Ch.1e MSC: Made up
31. ANS: A PTS: 1 DIF: k
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
32. ANS: C PTS: 1 DIF: c OBJ: Molar Relationships
STA: Ch. 4c
33. ANS: A PTS: 1 DIF: k REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3e
34. ANS: A PTS: 1 DIF: c REF: 2005 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2f
35. ANS: D PTS: 1 DIF: k OBJ: Scientific Investigation
STA: Ch. 1g
36. ANS: A PTS: 1 DIF: a REF: 2001 SOL
OBJ: Molar Relationships STA: Ch. 4b
37. ANS: C PTS: 1 DIF: c
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
38. ANS: C PTS: 1 DIF: a REF: dbutler
OBJ: Molar Relationhips STA: Ch. 4a MSC: Zumdahl 3rd Edition
39. ANS: D PTS: 1 DIF: c OBJ: Scientific Investigation
STA: ch.1a
40. ANS: B PTS: 1 DIF: a
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5f
41. ANS: B PTS: 1 DIF: c REF: 2009 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3d
42. ANS: C PTS: 1 DIF: k REF: ncook
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5d
43. ANS: A PTS: 1 DIF: c REF: dbutler
OBJ: Molar Relationships STA: Ch. 4a MSC: Zumdahl 3rd Edition
44. ANS: C PTS: 1 DIF: a OBJ: Scientific Investigation
STA: Ch. 1a
45. ANS: D PTS: 1 DIF: k OBJ: Scientific Investigation
STA: Ch. 1g

46. ANS: C PTS: 1 DIF: c REF: 2000 SOL
OBJ: Scientific Investigation STA: Ch. 1g
47. ANS: B PTS: 1 DIF: a REF: 2001 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
48. ANS: B PTS: 1 DIF: k REF: 2004 SOL
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5b
49. ANS: B PTS: 1 DIF: k REF: 2004 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2c
50. ANS: D PTS: 1 DIF: c REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3d
51. ANS: B PTS: 1 DIF: c REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
52. ANS: B PTS: 1 DIF: c REF: 2004 SOL
OBJ: Molar Relationships STA: Ch. 4c
53. ANS: A PTS: 1 DIF: c REF: tjones
OBJ: Scientific Investigation STA: Ch. 1g
54. ANS: C PTS: 1 DIF: c REF: 2003 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3d
55. ANS: C PTS: 1 DIF: a REF: 2004 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3f
56. ANS: D PTS: 1 DIF: a REF: 2009 SOL
OBJ: Molar Relationships STA: Ch. 4b
57. ANS: C PTS: 1 DIF: k
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 6a
58. ANS: D PTS: 1 DIF: k REF: 2004 SOL
OBJ: Scientific Investigation STA: Ch. 1g
59. ANS: B PTS: 1 DIF: c REF: 2007 SOL
OBJ: Molar Relationships STA: Ch. 4a
60. ANS: A PTS: 1 DIF: c OBJ: Scientific Investigation
STA: Ch. 1a