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

Chemistry Final Exam 2018-2019

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

____ 1. **Ch. 5a**

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

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

____ 2. **Ch. 1g**

The temperature of 25°C is ___ in Kelvins.

a. 298
b. 138
c. 248
d. 103

____ 3. **Ch. 2h**

Which of the following terms best describes a bowl of chocolate chip ice cream?

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

____ 4. **Ch. 1g**

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

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

Name: _____

____ 5. **Ch. 2h**

Which of the following does NOT involve a physical change?

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

____ 6. **Ch. 5b**

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

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

____ 7. **Ch. 2d**

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

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

____ 8. **Ch. 4b**

$$CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$$

If 1.0 mole of methane reacts with oxygen to produce carbon dioxide and water, what mass of water is produced?

a. 44 grams
b. 18 grams
c. 16 grams
d. 36 grams

____ 9. **Ch. 5a**

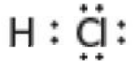
One of the main assumptions of the kinetic molecular theory of gases is that the particles of an ideal gas —

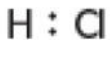
a. must be highly chemically reactive
b. must be single atoms instead of molecules
c. must exert no attractive forces
d. must be maintained at very high pressures

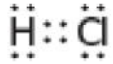
Name: _____

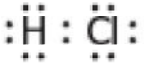
____ 10. **Ch. 3d**

Hydrogen chloride is a covalent compound.
Which is a correct Lewis dot structure for HCl?

a. 

b. 

c. 

d. 

____ 11. **Ch. 4a**

One mole of water weighs?

a. 16 g
b. 18 g
c. 1 g
d. 3 g

____ 12. **Ch. 4a**

What is the mass of a mole of $Ca(OH)_2$?

a. 57 grams
b. 114 grams
c. 58 grams
d. 74 grams

____ 13. **Ch. 4a**

A 1.0 mole sample of $MgSO_4$ weighs?

a. 60 g
b. 112 g
c. 120 g
d. 72 g

Name: _____

____ 14. **Ch. 1f**

A student measured the temperature of a boiling solution and found it to be 78.0°C at standard pressure. The theoretical temperature of that boiling solution is 80.0°C. What is the percent error in the student's measurement?

a. 0.025%
b. 0.25%
c. 2.5%
d. 25%

____ 15. **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 < X < Z
b. Y < Z < X
c. Z < Y < X
d. X < Y < Z

____ 16. **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

____ 17. **Ch. 2h**

All of the following are physical properties of matter EXCEPT:

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

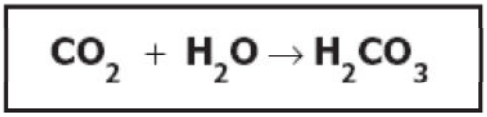
____ 18. **Ch. 2i**

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

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

Name: _____

____ 19. **Ch. 3e**



The reaction is which type of chemical reaction?

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

____ 20. **Ch. 6a**

Which substance below is organic?

a. K_2SO_4
b. H_2O
c. $C_6H_{12}O_6$
d. NaCl

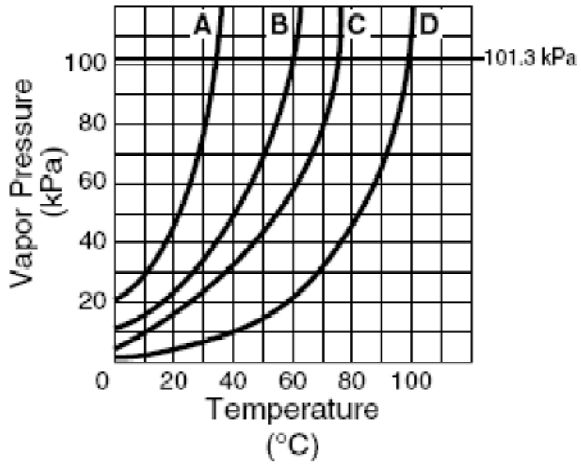
____ 21. **Ch. 3d**

Which of the following is the correct molecular shape of CH_4?

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

Name: _____

____ 22. **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. 100°C
b. 32°C
c. 92°C
d. 70°C

____ 23. **Ch. 3c**

A compound has 50% sulfur and 50% oxygen. What is its empirical formula?

a. SO_2
b. S_2O_4
c. SO_4
d. SO_3

____ 24. **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 pressure on the system
c. changing the identity of the catalyst
d. changing the temperature of the system

Name: _____

____ 25. **Ch. 1g**

A compound has a mass of $2.6632x10^2$ **g/mol.**
The number of significant figures in this mass is —

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

____ 26. **Ch. 2a**

The element copper exists as two naturally occurring isotopes. Cu-63 occurs 69% of the time and Cu-65 occurs 31% of the time. Which of the following calculations should be used to calculate the correct average atomic mass of copper?

a. $\frac{(63\ \text{amu} \times .69)}{(65\ \text{amu} \times .31)} \times 100$

b. $\frac{(63\ \text{amu} + .69) \times (65\ \text{amu} + .31)}{2}$

c. $(63\ \text{amu} \times .69) + (65\ \text{amu} \times .31)$

d. $\frac{(63\ \text{amu}) \times (65\ \text{amu})}{2}$

____ 27. **Ch. 3c**

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

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

____ 28. **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. 4
b. 1
c. 3
d. 2

Name: _____

____ 29. **Ch. 4b**

Consider the reaction : $Ca + 2\ H_2O \rightarrow Ca(OH)_2 + H_2$
A chemist reacts 20 g of calcium with 18 g of water.
If the reaction produces 37 g of calcium hydroxide,
what mass of hydrogen gas is produced?

a. 10 g
b. 2 g
c. 19 g
d. 1 g

____ 30. **Ch. 4c**

How many grams of sodium chloride are required to prepare 800.0 mL of a 1.25 M solution?

a. 76.3 g
b. 49.5 g
c. 90.6 g
d. 58.0 g

____ 31. **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. beaker
b. buret
c. evaporating dish
d. Erlenmeyer flask

____ 32. **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. +5
b. +3
c. +4
d. -1

____ 33. **Ch. 2a**

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

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

Name: _____

____ 34. **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. No change will occur
c. Equilibrium shifts to produce more reactant
d. The reaction will stop

____ 35. **Ch. 5e**

If the heat of vaporization of water is 533 cal/g, the amount of heat energy required to change 25.0 grams of water at 100°C to 25.0 grams of steam at 100°C is approximately—

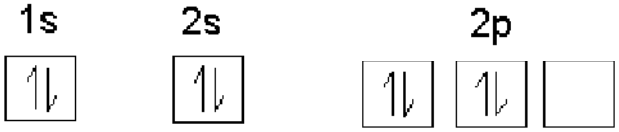
a. 13300 cal
b. 3730 cal
c. 533 cal
d. 21.3 cal

____ 36. **Ch. 3c**

A compound is composed of 82.7% carbon and 17.3% hydrogen.
The compound has a formula mass of 58.14 grams.
What is the molecular formula?

a. CH_2
b. C_3H_6
c. C_2H_5
d. C_4H_{10}

____ 37. **Ch. 2g**

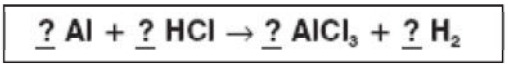


The orbital diagram above is

a. incorrect because it violates Heisenberg's rule
b. incorrect because it violates Hund's rule
c. incorrect because it violates Pauli's rule
d. correct

Name: _____

____ 38. **Ch. 3b**



Which set of coefficients will balance this equation?

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

____ 39. **Ch. 4c**

What mass of $B(OH)_3$ is needed to prepare 333 ml of a 0.300 M solution?

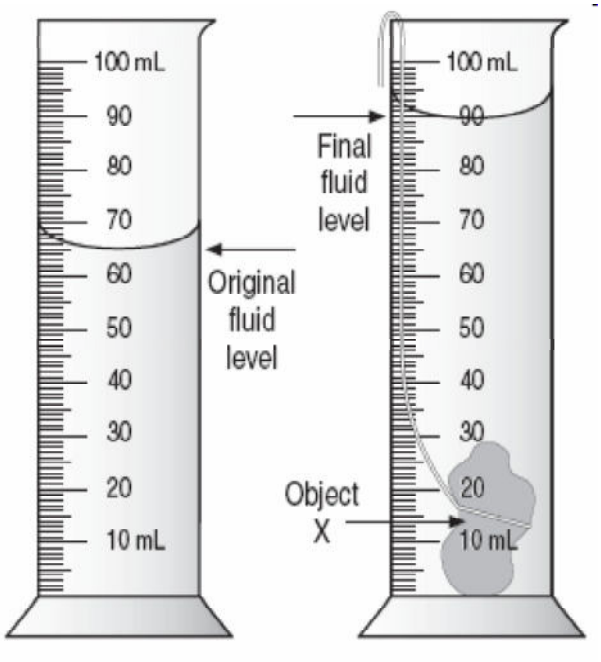
a. 6.8 g
b. 6.17 g
c. 68.8 g
d. 2.79 g

____ 40. **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. decreases from top to bottom with group 17 elements
b. is constant within group 17 elements
c. increases from top to bottom within group 17 elements
d. is independent of periodic position

Name: _____



____ 41. **Chem. 1a**

The volume of the object in the graduated cylinder is

a. 20 mL
b. 35 mL
c. 30 mL
d. 25 mL

____ 42. **Ch. 4a**

What is the density of carbon dioxide at STP?

a. 1.96 g/L
b. 5.09×10^{-1} g/L
c. 46.0 g/L
d. 22.0 g/L

____ 43. **Ch. 4b**

For the reaction $N_2 + 3H_2 \rightarrow 2NH_3$, how many moles of nitrogen are required to produce 18 moles of ammonia?

a. 36 mol
b. 18 mol
c. 27 mol
d. 9.0 mol

Name: _____

____ 44. **Ch. 5f**

Solid magnesium has a specific heat of 1.01 J/g°C. How much heat is absorbed by a 10.0 gram sample of magnesium when it is heated from 70.0°C to 80.0°C.

a. 808 J
b. 101 J
c. 404 J
d. 1010 J

____ 45. **Ch. 1g**

X	Y
10	250
20	150
30	100
40	50

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

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

____ 46. **Ch. 1e**

A student measured the mass of a ball bearing three times and recorded the following data.

Trial	Mass, g
1	23.4 g
2	23.3 g
3	23.5 g

If the actual mass of the ball bearing is 24.5 g, what can be said about the data?

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

____ 47. **Ch. 3d**

When carbon and hydrogen combine to form a molecular compound -

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

Name: _____

____ 48. **Ch. 3e**

$$Na_2CO_3 + Ca(OH)_2 \rightarrow 2NaOH + CaCO_3$$

Which type of reaction is represented here?

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

____ 49. **Ch. 5b**

A gas has a volume of 84.0 cm^3 at a temperature of 45.0°C. What volume would the gas occupy at a temperature of -23.0°C if the pressure stays constant?

a. 66.0 cm^3
b. 42.9 cm^3
c. 164 cm^3
d. 107cm^3

____ 50. **Ch. 3e**

Which of these represents a synthesis reaction?

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

____ 51. 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. compound
b. heterogeneous mixture
c. homogeneous mixture
d. element

____ 52. **Ch. 3a**

What is the name of the compound whose formula is $CuSO_4$?

a. copper (IV) sulfur tetraoxide
b. copper (II) sulfate
c. copper (I) sulfate
d. copper sulfate

Name: _____

_____ 53. **Ch. 1i**

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

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

_____ 54. **Chem. 1a**

For an experiment, 9.7 mL of HCl are needed. What is the best instrument to use for measuring this volume?

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

_____ 55. **Ch. 4a**

What is the molar mass of K_2SO_4?

a. 86 g/mol
b. 78.4 g/mol
c. 135.16 g/mol
d. 174.26 g/mol

_____ 56. **Ch. 5d**

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

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

Name: _____

____ 57. **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. 2
c. 1
d. 4

____ 58. **Ch. 3c**

The formula for magnesium chloride is —

a. Mg_2Cl_3
b. $MnCl_2$
c. $MgCl_2$
d. MnCl

Name: _____

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

Data Table

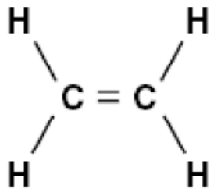
evaporating dish + watch glass	42.70 g
evaporating dish + watch glass + $NaHCO_3$	45.20 g
evaporating dish + watch glass + NaCl	44.45 g

____ 59. **Chem. 1a**

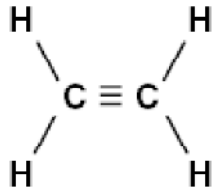
A student conducted an experiment and was interested in the mass of the product of the chemical reaction. Some results of the experiment are shown above. What is the mass of the NaCl?

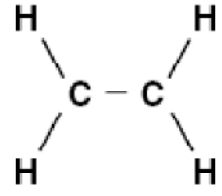
a. 1.75 g
b. 2.25 g
c. 0.75 g
d. 2.50 g

____ 60. **The correct structural formula for C_2H_4 is —**

a.


b. $H-C\equiv C-H$

c.


d.


Chemistry Final Exam 2018-2019
Answer Section

MULTIPLE CHOICE

1. ANS: C PTS: 1 DIF: k REF: 2001 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5a
2. ANS: A PTS: 1 DIF: k OBJ: Scientific Investigation
   STA: Ch. 1g
3. ANS: D PTS: 1 DIF: k
   OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
4. ANS: B PTS: 1 DIF: k OBJ: Scientific Investigation
   STA: Ch. 1g
5. ANS: B PTS: 1 DIF: c
   OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
6. ANS: C PTS: 1 DIF: k REF: 2004 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5b
7. ANS: B PTS: 1 DIF: k REF: 2005 SOL
   OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2d
8. ANS: D PTS: 1 DIF: a REF: 2009 SOL
   OBJ: Molar Relationships STA: Ch. 4b
9. ANS: C PTS: 1 DIF: k REF: 2001 SOL
   OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5a
10. ANS: A PTS: 1 DIF: c REF: 2009 SOL
    OBJ: Chemical Formulas and Reactions STA: Ch. 3d
11. ANS: B PTS: 1 DIF: c REF: dbutler
    OBJ: Molar Relationships STA: Ch. 4a MSC: Zumdahl 3rd Edition
12. ANS: D PTS: 1 DIF: c REF: 2007 SOL
    OBJ: Molar Relationships STA: Ch. 4a
13. ANS: C PTS: 1 DIF: c REF: dbutler
    OBJ: Molar Relationships STA: Ch. 4a MSC: Zumdahl 3rd Edition
14. ANS: C PTS: 1 DIF: c REF: 2000 SOL
    OBJ: Scientific Investigation STA: Ch. 1f
15. ANS: A PTS: 1 DIF: a REF: 2009 SOL
    OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5d
16. ANS: B PTS: 1 DIF: k REF: 2004 SOL
    OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5e
17. ANS: C PTS: 1 DIF: k
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
18. ANS: C PTS: 1 DIF: c REF: 2000 SOL
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2i
19. ANS: B PTS: 1 DIF: k REF: 2007 SOL
    OBJ: Chemical Formulas and Reactions STA: Ch. 3e
20. ANS: C PTS: 1 DIF: k
    OBJ: Atomic Structure and Periodic Relationships STA: Ch. 6a
21. ANS: C PTS: 1 DIF: c REF: 2003 SOL
    OBJ: Chemical Formulas and Reactions STA: Ch. 3d

22. ANS: C PTS: 1 DIF: k REF: 2004 SOL
OBJ: Scientific Investigation STA: Ch. 1g
23. ANS: A PTS: 1 DIF: a REF: 2001 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
24. ANS: C PTS: 1 DIF: c REF: 2009 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3f
25. ANS: B PTS: 1 DIF: k REF: 2007 SOL
OBJ: Scientific Investigation STA: Ch. 1g
26. ANS: C PTS: 1 DIF: c REF: 2001 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2a
27. ANS: B PTS: 1 DIF: k REF: 2005 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
28. ANS: A PTS: 1 DIF: c REF: 2000 SOL
OBJ: Scientific Investigation STA: Ch. 1g
29. ANS: D PTS: 1 DIF: c REF: ncook
OBJ: Molar Relationships STA: Ch. 4b MSC: made it up
30. ANS: D PTS: 1 DIF: c REF: 2004 SOL
OBJ: Molar Relationships STA: Ch. 4c
31. ANS: D PTS: 1 DIF: k OBJ: Scientific Investigation
STA: Ch. 1a
32. ANS: A PTS: 1 DIF: c REF: 2007 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2g
33. ANS: C PTS: 1 DIF: c REF: 2003 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2a
34. ANS: C PTS: 1 DIF: a REF: 2004 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3f
35. ANS: A PTS: 1 DIF: c REF: 2003 SOL
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5e
36. ANS: D PTS: 1 DIF: a REF: 2003 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
37. ANS: B PTS: 1 DIF: c REF: 2004 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2g
38. ANS: B PTS: 1 DIF: c REF: 2005 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3b
39. ANS: B PTS: 1 DIF: c OBJ: Molar Relationships
STA: Ch. 4c
40. ANS: C PTS: 1 DIF: c REF: 2005 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2f
41. ANS: D PTS: 1 DIF: c OBJ: Scientific Investigation
STA: ch.1a
42. ANS: A PTS: 1 DIF: a REF: 2003 SOL
OBJ: Molar Relationships STA: Ch. 4a
43. ANS: D PTS: 1 DIF: a REF: 2001 SOL
OBJ: Molar Relationships STA: Ch. 4b
44. ANS: B PTS: 1 DIF: a
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5f
45. ANS: C PTS: 1 DIF: c REF: tjones
OBJ: Scientific Investigation STA: Ch. 1g

46. ANS: C PTS: 1 DIF: c REF: tjones
OBJ: Scientific Investigation STA: Ch.1e MSC: Made up
47. ANS: D PTS: 1 DIF: k REF: ncook
OBJ: Chemical Formulas and Reactions STA: Ch. 3d MSC: made it up
48. ANS: D PTS: 1 DIF: k REF: 2005 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3e
49. ANS: D PTS: 1 DIF: a REF: 2000 SOL
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5b
50. ANS: B PTS: 1 DIF: k REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3e
51. ANS: C PTS: 1 DIF: c
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2h
52. ANS: B PTS: 1 DIF: c OBJ: Chemical Formulas and Reactions
STA: Ch. 3a
53. ANS: D PTS: 1 DIF: k REF: tjones
OBJ: Scientific Investigation STA: ch.1i
54. ANS: B PTS: 1 DIF: c OBJ: Scientific Investigation
STA: Ch. 1a
55. ANS: D PTS: 1 DIF: a REF: dbutler
OBJ: Molar Relationhips STA: Ch. 4a MSC: Zumdahl 3rd Edition
56. ANS: A PTS: 1 DIF: k REF: ncook
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5d
57. ANS: C PTS: 1 DIF: k REF: 2004 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2c
58. ANS: C PTS: 1 DIF: c REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c
59. ANS: A PTS: 1 DIF: a OBJ: Scientific Investigation
STA: Ch. 1a
60. ANS: A PTS: 1 DIF: a REF: 2003 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c