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

Chemistry Final Exam 2018-2019

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

____ 1. **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. 2.79 g
d. 68.8 g

____ 2. **Ch. 6a**

Which substance below is organic?

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

____ 3. **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

____ 4. 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. homogeneous mixture
b. heterogeneous mixture
c. element
d. compound

Name: _____

_____ 5. **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. C_4H_{10}
b. C_2H_5
c. C_3H_6
d. CH_2

_____ 6. **Ch. 3a**

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

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

_____ 7. **Ch. 3e**

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

Which type of reaction is represented here?

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

_____ 8. **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. High precision, high accuracy
b. High precision, low accuracy
c. Low precision, high accuracy
d. Low precision, low accuracy

Name: _____

____ 9. **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. 2.5%
c. 0.25%
d. 25%

____ 10. **Ch. 1g**

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

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

____ 11. **Ch. 4c**

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

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

____ 12. **Ch. 5e**

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

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

____ 13. **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. 18 mol
b. 36 mol
c. 9.0 mol
d. 27 mol

Name: _____

_____ 14. **Ch. 5b**

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

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

_____ 15. **Ch. 2h**

All of the following are physical properties of matter EXCEPT:

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

_____ 16. **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. 1010 J
b. 101 J
c. 404 J
d. 808 J

_____ 17. **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. 3730 cal
b. 533 cal
c. 21.3 cal
d. 13300 cal

_____ 18. **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 be maintained at very high pressures
d. must exert no attractive forces

Name: _____

____ 19. **Ch. 5a**

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

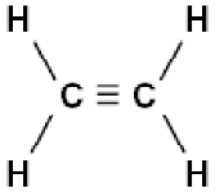
a. increased as the temperature is decreased
b. always equal to zero
c. unaffected by temperature changes
d. increased as the temperature is increased

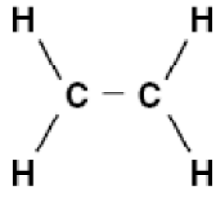
____ 20. **Ch. 3d**

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

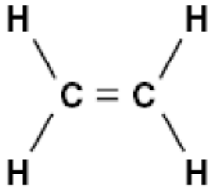
a. Tetrahedral
b. Linear
c. Bent
d. Pyramidal

____ 21. **The correct structural formula for C_2H_4 is —**

a. 

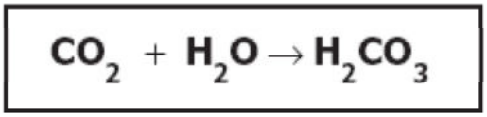
b. 

c. 

d. 

Name: _____

____ 22. **Ch. 3e**



The reaction is which type of chemical reaction?

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

____ 23. **Ch. 1i**

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

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

____ 24. **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. 1
b. 4
c. 3
d. 2

____ 25. **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. Beaker
d. Erlenmeyer flask

Name: _____

_____ 26. **Ch. 4a**

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

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

_____ 27. **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. 2 g
b. 10 g
c. 1 g
d. 19 g

_____ 28. **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. -1
c. +3
d. +4

_____ 29. **Ch. 3d**

When carbon and hydrogen combine to form a molecular compound -

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

_____ 30. **Ch. 3c**

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

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

Name: _____

____ 31. **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. is independent of periodic position
b. is constant within group 17 elements
c. decreases from top to bottom with group 17 elements
d. increases from top to bottom within group 17 elements

____ 32. **Ch. 1g**

X	Y
10	250
20	150
30	100
40	50

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

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

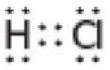
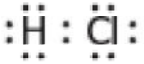
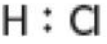
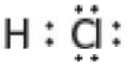
____ 33. **Ch. 2h**

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

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

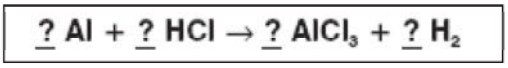
____ 34. **Ch. 3d**

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

a. 
b. 
c. 
d. 

Name: _____

____ 35. **Ch. 3b**



Which set of coefficients will balance this equation?

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

____ 36. **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

____ 37. **Ch. 2h**

Which of the following does NOT involve a physical change?

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

____ 38. **Ch. 5d**

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

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

Name: _____

____ 39. **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. 3
b. 4
c. 1
d. 2

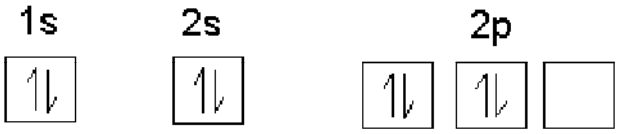
____ 40. **Ch. 4b**

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

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

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

____ 41. **Ch. 2g**



The orbital diagram above is

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

____ 42. **Ch. 4a**

One mole of water weighs?

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

Name: _____

____ 43. **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. Erlenmeyer flask
b. buret
c. evaporating dish
d. beaker

____ 44. **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. $\dfrac{(63\text{ amu}) \times (65\text{ amu})}{2}$

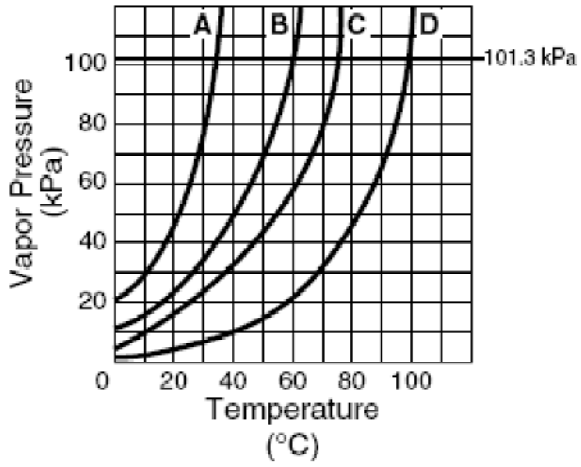
b. $(63\text{ amu} \times .69) + (65\text{ amu} \times .31)$

c. $\dfrac{(63\text{ amu} \times .69)}{(65\text{ amu} \times .31)} \times 100$

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

Name: _____

____ 45. **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. 32°C
c. 92°C
d. 100°C

____ 46. **Ch. 3e**

Which of these represents a synthesis reaction?

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

____ 47. **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 reactant
b. No change will occur
c. The reaction will stop
d. Equilibrium shifts to produce more product

Name: _____

____ 48. **Ch. 4a**

What is the density of carbon dioxide at STP?

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

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

____ 50. **Ch. 1g**

The temperature of 25°C is ___ in Kelvins.

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

____ 51. **Ch. 4a**

What is the molar mass of K_2SO_4?

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

____ 52. **Ch. 4a**

A 1.0 mole sample of $MgSO_4$ weighs?

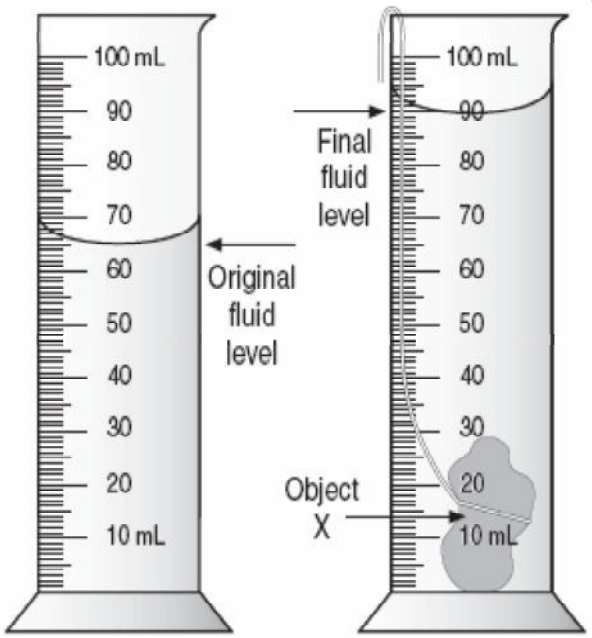
a. 120 g
b. 72 g
c. 60 g
d. 112 g

Name: _____

____ 53. **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. X < Y < Z
d. Z < Y < X



____ 54. **Chem. 1a**

The volume of the object in the graduated cylinder is

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

____ 55. **Ch. 2d**

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

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

Name: _____

____ 56. **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 present in the atomic nucleus
c. more protons are orbiting the atomic nucleus
d. more electrons are orbiting the atomic nucleus

____ 57. **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. an atom has electrons in discrete energy levels
c. each atom has a specific number of positive charges
d. atomic mass is determined by the number of protons and neutrons in an atom

____ 58. **Ch. 3c**

The formula for magnesium chloride is —

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

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. 2.50 g
d. 0.75 g

____ 60. **Ch. 3c**

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

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

Chemistry Final Exam 2018-2019
Answer Section

MULTIPLE CHOICE

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

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

46. ANS: B PTS: 1 DIF: k REF: 2007 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3e
47. ANS: A PTS: 1 DIF: a REF: 2004 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3f
48. ANS: B PTS: 1 DIF: a REF: 2003 SOL
OBJ: Molar Relationships STA: Ch. 4a
49. ANS: D PTS: 1 DIF: a REF: 2000 SOL
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5b
50. ANS: A PTS: 1 DIF: k OBJ: Scientific Investigation
STA: Ch. 1g
51. ANS: B PTS: 1 DIF: a REF: dbutler
OBJ: Molar Relationhips STA: Ch. 4a MSC: Zumdahl 3rd Edition
52. ANS: A PTS: 1 DIF: c REF: dbutler
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53. ANS: B PTS: 1 DIF: a REF: 2009 SOL
OBJ: Phases of Matter and Kinetic Molecular Theory STA: Ch. 5d
54. ANS: D PTS: 1 DIF: c OBJ: Scientific Investigation
STA: ch.1a
55. ANS: D PTS: 1 DIF: k REF: 2005 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2d
56. ANS: B PTS: 1 DIF: c REF: 2003 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2a
57. ANS: B PTS: 1 DIF: c REF: 2000 SOL
OBJ: Atomic Structure and Periodic Relationships STA: Ch. 2i
58. ANS: A 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: D PTS: 1 DIF: k REF: 2005 SOL
OBJ: Chemical Formulas and Reactions STA: Ch. 3c