ANSWER SHEET
Practice Test 3

Determine the correct answer for each question. Then, using a No. 2 pencil, blacken completely the oval containing the letter of your choice.

1. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
2. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
3. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
4. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
5. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
6. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
7. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
8. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
9. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
10. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
11. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
12. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
13. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
14. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
15. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
16. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

17. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
18. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
19. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
20. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
21. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
22. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
23. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ

ON THE ACTUAL CHEMISTRY TEST. THE FOLLOWING TYPE OF QUESTION MUST BE ANSWERED ON A SPECIAL SECTION (LABELED "CHEMISTRY") AT THE LOWER LEFT-HAND CORNER OF PAGE 2 OF YOUR ANSWER SHEET. THESE QUESTIONS WILL BE NUMBERED BEGINING WITH 101 AND MUST BE ANSWERED ACCORDING TO THE DIRECTIONS.

CHEMISTRY* Fill in oval CE only if II is a correct explanation of 1.

	I	II	CE*
101.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
102.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
103.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
104.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
105.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
106.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
107.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
108.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
109.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
110.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
111.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
112.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
113.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
114.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
115.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯
116.	Ⓣ Ⓕ	Ⓣ Ⓕ	◯

ANSWER SHEET
Practice Test 3

ON THE ACTUAL CHEMISTRY TEST, THE REMAINING QUESTIONS MUST BE ANSWERED BY RETURNING TO THE SECTION OF YOUR ANSWER SHEET YOU STARTED FOR CHEMISTRY.

24. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	40. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	56. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
25. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	41. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	57. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
26. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	42. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	58. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
27. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	43. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	59. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
28. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	44. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	60. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
29. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	45. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	61. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
30. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	46. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	62. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
31. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	47. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	63. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
32. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	48. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	64. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
33. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	49. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	65. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
34. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	50. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	66. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
35. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	51. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	67. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
36. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	52. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	68. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
37. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	53. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	69. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ
38. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	54. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	
39. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	55. Ⓐ Ⓑ Ⓒ Ⓓ Ⓔ	

PRACTICE TEST 3

Note: For all questions involving solutions and/or chemical equations, assume that the system is in water unless otherwise stated.

Reminder: You may *not* use a calculator on these tests.
  The following symbols have the meanings listed unless otherwise noted.

|	
H	= enthalpy
M	= molar
n	= number of moles
P	= pressure
R	= molar gas constant
S	= entropy
T	= temperature
V	= volume
atm	= atmosphere
g	= gram(s)
J	= joules(s)
kJ	= kilojoules
L	= liter(s)
mL	= milliliter(s)
mol	= mole(s)
mm	= millimeter(s)
V	= volt(s)

PART A

Directions: Every set of the given lettered choices below refers to the numbered statements or formulas immediately following it. Choose the one lettered choice that best fits each statement or formula and then fill in the corresponding oval on the answer sheet. Each choice may be used once, more than once, or not at all in each set.

Questions 1–4 refer to the following diagram:
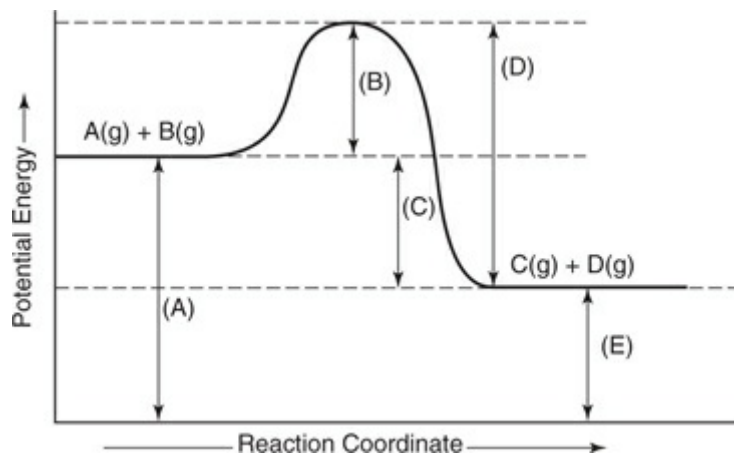
1. The activation energy of the forward reaction is shown by

2. The activation energy of the reverse reaction is shown by

3. The heat of the reaction for the forward reaction is shown by

4. The potential energy of the reactants is shown by

Questions 5–7 refer to the following diagram and information:
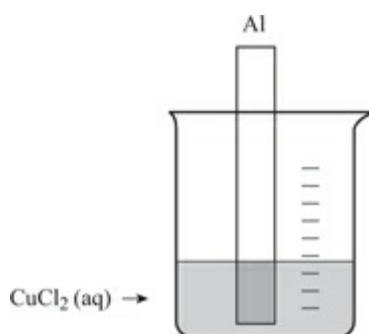
When a strip of aluminum is placed in a solution of copper(II) chloride, a reaction takes place. As time goes by, a brown solid forms on the strip of aluminum and the blue solution turns clearer.

5. One product of the reaction would be
   (A) $AlCl_2$
   (B) $AlCl_3$
   (C) $AlCl_4$
   (D) $CuAl_3$
   (E) $CuAl_2$

6. The aluminum is
   (A) being deprotonated
   (B) being disproportionated
   (C) being reduced

(D) being oxidized
(E) gaining mass

7. The copper(II) ion concentration in solution

(A) is zero at the beginning of the reaction
(B) has no effect on the rate of the reaction
(C) stays the same and doesn't influence the color of the solution
(D) increases, making the solution less blue
(E) decreases, making the solution less blue

Questions 8–11 match the following equations to the appropriate descriptions:

(A) $V/T = k$
(B) $P/T = k$
(C) $PV = k$
(D) $P_T = P_1 + P_2 + P_3 \cdots$
(E) $PT = k$

8. This equation shows the volume decreasing as the pressure is increased when the temperature is held constant. It is an example of Boyle's Law.

9. This equation shows the pressure increasing as the temperature is increased when the volume is held constant. It is an example of Gay-Lussac's Law.

10. This equation shows the volume increasing as the temperature is increased when the pressure is held constant. It is an example of Charles's Law.

11. This equation shows that the total pressure of a mixture of gases is equal to the sum of the partial pressures of the component gases.

Questions 12–14

(A) 1
(B) 2
(C) 3
(D) 4
(E) 5

12. When the following reaction equation is balanced, what will be the coefficient of the $NaNO_3$ using the smallest whole number?

$$NaI(aq) + Pb(NO_3)_2(aq) \rightarrow NaNO_3(aq) + PbI_2(s)$$
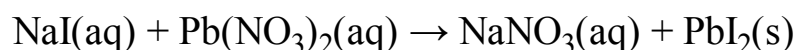
13. If 0.5 moles of PbI_2 formed according to the balanced equation from question 12, how many moles of NaI were needed to make it?

14. If $NaNO_3$ goes into solution as ions, into how many ions would it dissociate?

Questions 15–18

        (A) Ionic substance
        (B) Polar covalent substance
        (C) Nonpolar covalent substance
        (D) Amorphous substance
        (E) Metallic network

15. $MgCl_2(s)$

16. $HCl(g)$

17. $CH_3–CH_3(g)$

18. $Cu(s)$

Questions 19–23

        (A) Dissociation
        (B) Amphoteric
        (C) Phenolphthalein
        (D) Dehydration
        (E) Deliquescence

19. The reason why a blue crystal of $CuSO_4 \cdot 5H_2O$ turns white when heated

20. The reason why ionic substances dissolved in water exhibit conductivity

21. The reason there may be a pink color in a basic solution

22. The reason why a substance may act like an acid or like a base depending on the substance it is in the presence of

23. The reason why an ionic solid may dissolve in the moisture it absorbs from the air

PART B

ON THE ACTUAL CHEMISTRY TEST, THE FOLLOWING TYPE OF

QUESTION MUST BE ANSWERED ON A SPECIAL SECTION (LABELED "CHEMISTRY") AT THE LOWER LEFT-HAND CORNER OF PAGE 2 OF YOUR ANSWER SHEET. THESE QUESTIONS WILL BE NUMBERED BEGINNING WITH 101 AND MUST BE ANSWERED ACCORDING TO THE FOLLOWING DIRECTIONS.

Directions: Every question below contains two statements, I in the left-hand column and II in the right-hand column. For each question, decide if statement I is true or false <u>and</u> if statement II is true or false and fill in the corresponding T or F ovals on your answer sheet. *<u>Fill in oval CE only if statement II is a correct explanation of statement I</u>.

Sample Answer Grid:

CHEMISTRY * Fill in oval CE only if II is a correct explanation of I.

	I	II	CE*
101.	T F	T F	◯

I

II

101. Elements in the upper/left corner of the Periodic Table are active metals

BECAUSE metals have larger ionic radii than their atomic radii.

102. A synthesis reaction that is nonspontaneous and has a negative value for its heat of reaction will not occur until some heat is added

BECAUSE nonspontaneous exothermic reactions need enough activation energy to get them started.

103. Transition elements in a particular period may have the same oxidation number

BECAUSE they have a complete outer energy level.

104. When a crystal is added to a supersaturated solution of itself, the crystal does not appear to change

BECAUSE the supersaturated solution is holding more solute than its normal solubility.

105. Equilibrium is a static condition

BECAUSE at equilibrium, the forward reaction rate equals the reverse reaction rate.

106. The ionic bond is the strongest bond

BECAUSE ionic bonds have electrostatic attraction due to the loss and gain of electron(s).

107. In the equilibrium reaction $N_2(g) + 3H_2(g) \leftrightarrow 2NH_3(g)$ + heat when the pressure in the

BECAUSE the increase in pressure causes the reaction to shift to the right to decrease the pressure since

reaction chamber is increased, the reaction shifts to the right		4 volumes on the left become 2 volumes on the right.

108. If the forward reaction of an equilibrium is exothermic, adding heat to the system favors the reverse reaction   BECAUSE   additional heat causes a stress on the system, and the system moves in the direction that releases the stress.

109. An element that has an electron configuration of $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3\ 4s^2$ is a transition element   BECAUSE   the transition elements from scandium to zinc are filling the $3d$ orbitals.

110. The most electronegative elements in the periodic chart are found among nonmetals   BECAUSE   electronegativity is a measure of the ability of an atom to draw valence electrons to itself.

111. Basic anhydrides react in water to form bases   BECAUSE   metallic oxides react with water to form solutions that have an excess of hydroxide ions.

112. There are 3 moles of atoms in 18 grams of water   BECAUSE   there are 6×10^{23} atoms in 1 mole.

113. Benzene is a good electrolyte   BECAUSE   a good electrolyte has charged ions that carry the electric current.

114. Normal butyl alcohol and 2-butanol are isomers   BECAUSE   isomers vary in the number of neutrons in the nucleus of the atom.

115. The reaction of $CaCO_3$ and HCl goes to completion   BECAUSE   reactions that form a precipitate tend to go to completion.

116. A large number of alpha particles were deflected in the Rutherford experiment   BECAUSE   alpha particles that came close to the nucleus of the gold atoms were deflected.

PART C

Directions: Every question or incomplete statement below is followed by five suggested answers or completions. Choose the one that is best in each case and then fill in the corresponding oval on the answer sheet.

24. What are the simplest whole-number coefficients that balance this equation?

$$\ldots C_4H_{10} + \ldots O_2 \rightarrow \ldots CO_2 + \ldots H_2O$$
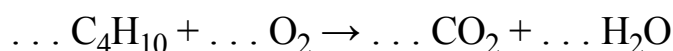
(A) 1, 6, 4, 2

(B) 2, 13, 8, 10
(C) 1, 6, 1, 5
(D) 3, 10, 16, 20
(E) 4, 26, 16, 20

25. How many atoms are present in the formula $KAl(SO_4)_2$?

(A) 7
(B) 9
(C) 11
(D) 12
(E) 13

26. All of the following are compounds EXCEPT

(A) copper sulfate
(B) carbon dioxide
(C) washing soda
(D) air
(E) lime

27. What volume of gas, in liters, would 2.0 moles of hydrogen occupy at STP?

(A) 11.2
(B) 22.4
(C) 33.6
(D) 44.8
(E) 67.2

28. What is the maximum number of electrons held in the d orbitals?

(A) 2
(B) 6
(C) 8
(D) 10
(E) 14

29. If an element has an atomic number of 11, it will combine most readily with an element that has an electron configuration of

(A) $1s^2 2s^2 2p^6 3s^2 3p^1$
(B) $1s^2 2s^2 2p^6 3s^2 3p^2$
(C) $1s^2 2s^2 2p^6 3s^2 3p^3$
(D) $1s^2 2s^2 2p^6 3s^2 3p^4$
(E) $1s^2 2s^2 2p^6 3s^2 3p^5$

30. An example of a physical property is

(A) rusting
(B) decay
(C) souring
(D) low melting point
(E) high heat of formation

31. A gas at STP that contains 6.02×10^{23} atoms and forms diatomic molecules will occupy

(A) 11.2 L
(B) 22.4 L
(C) 33.6 L
(D) 67.2 L
(E) 1.06 qt

32. When excited electrons cascade to lower energy levels in an atom,

(A) visible light is always emitted
(B) the potential energy of the atom increases
(C) the electrons always fall back to the first energy level
(D) the electrons fall indiscriminately to all levels
(E) the electrons fall back to a lower unfilled energy level

33. Mass spectroscopy uses the concept that

(A) charged particles are evenly deflected in a magnetic field
(B) charged particles are deflected in a magnetic field inversely to the mass of the particles
(C) particles of heavier mass are deflected in a magnetic field to a greater degree than lighter particles
(D) particles are evenly deflected in a magnetic field

34. The bond that describes an interaction between two orbitals that is not symmetrical about a line between the two atoms' nuclei is called

(A) a pi bond
(B) a sigma bond
(C) a hydrogen bond
(D) a covalent bond
(E) an ionic bond

35. What is the boiling point of water at the top of Pikes Peak? (Note: Pikes Peak is well above sea level.)

(A) It is 100°C.
(B) It is >100°C since the pressure is less than at ground level.
(C) It is <100°C since the pressure is less than at ground level.
(D) It is >100°C since the pressure is greater than at ground level.

(E) It is <100°C since the pressure is greater than at ground level.

36. The atomic structure of the alkane series contains the hybrid orbitals designated as

   (A) sp
   (B) sp^2
   (C) sp^3
   (D) sp^3d^2
   (E) sp^4d^3

37. Which of the following is (are) true for this reaction?

$$Cu + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2H_2O + 2NO_2(g)$$
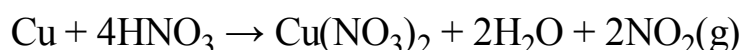
   I. It is an oxidation-reduction reaction.
   II. Copper is oxidized.
   III. The oxidation number of nitrogen goes from +5 to +4.

   (A) I only
   (B) III only
   (C) I and II only
   (D) II and III only
   (E) I, II, and III

38. Which of the following properties can be attributed to water?

   I. It has a permanent dipole moment attributed to its molecular structure.
   II. It is a very good conductor of electricity.
   III. It has its polar covalent bonds with hydrogen on opposite sides of the oxygen atom, so that the molecule is linear.

   (A) I only
   (B) III only
   (C) I and II only
   (D) II and III only
   (E) I, II, and III

39. All of the following statements are true for this reaction EXCEPT

$$HCl(g) + H_2O(l) \rightarrow H_3O^+(aq) + Cl^-(aq)$$
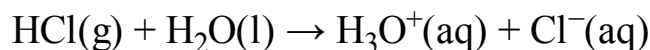
(A) H_3O^+ is the conjugate acid of H_2O.