For reference only.

ANSWER SHEET
Practice Test 1

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.	Ⓣ Ⓕ	Ⓣ Ⓕ	○

For reference only.

ANSWER SHEET
Practice Test 1

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

PRACTICE TEST 1

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 1–6 refer to the choices in the following table:

Periodic Table (abbreviated)

^{3}Li					(D)	^{10}Ne
	(A)			(C)		
(B)	^{20}Ca					(E)

1. The most electronegative element

2. The element with a possible oxidation number of −2

3. The element that would react in a 1:1 ratio with (D)

4. The element with the smallest ionic radius

5. The element with the smallest first ionization potential

6. The element with a complete *p* orbital as its outermost energy level

Questions 7–9 refer to the following terms.

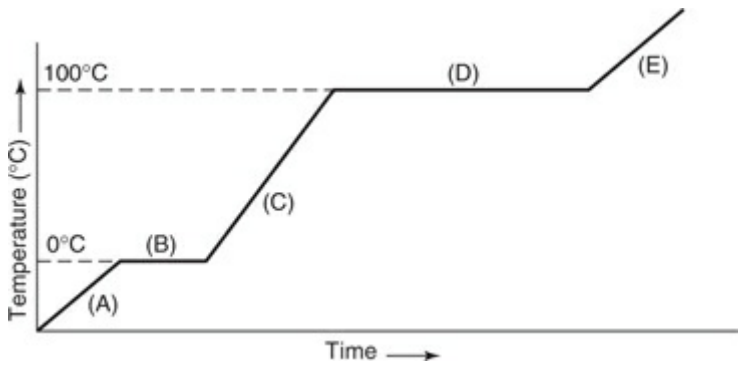
(A) Reduction potential
(B) Ionization energy
(C) Electronegativity
(D) Heat of formation
(E) Activation energy

7. This is the energy change that accompanies the combining of elements in their natural states to form one mole of a compound.

8. This is the energy needed to remove an electron from a gaseous atom in its ground state.

9. This is the minimum energy needed for molecules to react.

Questions 10–12 refer to the following heating curve for water:

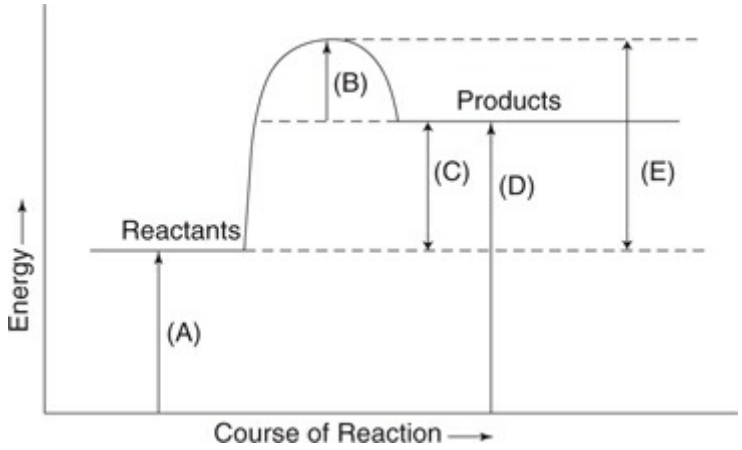


10. In which part of the curve is the state of H_2O only a solid?

11. Which part of the graph shows a phase change requiring the greatest amount of energy?

12. Where is the temperature of H_2O changing at 4.18 J/g°C (or 1 cal/g°C)?

Questions 13–15 refer to the following diagram:



13. Indicates the activation energy of the forward reaction

14. Indicates the activation energy of the reverse reaction

15. Indicates the difference between the activation energies for the reverse and forward reactions and equals the energy change in the reaction

Questions 16–18 refer to the following elements in the ground state:

(A) Fe
(B) Au
(C) Na
(D) Ar
(E) U

16. A common metal element that resists reaction with acids

17. A monatomic element that exists in the gaseous state at STP

18. A transition element described as having its inner 3*d* orbital partially filled

Questions 19 and 20 refer to the following:

(A) Radioactive isotope
(B) Monoclinic crystal
(C) Sulfur trioxide
(D) Sulfate salt
(E) Allotropic form

19. A substance that exhibits a resonance structure

20. A product formed from a base reacting with H_2SO_4.

Questions 21–23 refer to the following terms:

(A) Dilute
(B) Concentrated
(C) Unsaturated
(D) Saturated
(E) Supersaturated

21. The condition, unrelated to quantities, that indicates that the rate going into solution is equal to the rate coming out of solution

22. The condition that exists when a water solution that has been at equilibrium and saturated is heated to a higher temperature with a higher solubility, but no additional solute is added

23. The descriptive term that indicates there is a large quantity of solute, compared with the amount of solvent, in a solution

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 and if statement II is true or false and fill in the corresponding T or F ovals on your answer sheet. *Fill in oval CE only if statement II is a correct explanation of statement I.

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. Nonmetallic oxides are usually acid anhydrides	BECAUSE	nonmetallic oxides form acids when placed in water.
102. When HCl gas and NH_3 gas come into contact, a white smoke forms	BECAUSE	NH_3 and HCl react to form a white solid, ammonium chlorate.
103. The reaction of barium chloride and sodium sulfate does not go to completion	BECAUSE	the compound barium sulfate is formed as an insoluble precipitate.
104. When two elements react exothermically to form a compound, the compound should be relatively stable	BECAUSE	the release of energy from a combination reaction indicates that the compound formed is at a lower energy level than the reactants and thus relatively stable.
105. The ion of a nonmetallic atom is larger in radius than the atom	BECAUSE	when a nonmetallic ion is formed, it gains electrons in the outer orbital and thus increases the size of the electron cloud around the nucleus.
106. Oxidation and reduction occur together	BECAUSE	in redox reactions, electrons must be gained and lost.
107. Decreasing the atmospheric pressure on a pot of boiling water causes the water to stop boiling	BECAUSE	changes in pressure are directly related to the boiling point of water.
108. The reaction of hydrogen with oxygen to form water is an exothermic reaction	BECAUSE	water molecules have polar covalent bonds.
109. Atoms of different elements can have the same mass number	BECAUSE	the atoms of each element have a characteristic number of protons in the nucleus.
110. The proton and the neutron have essentially the same mass	BECAUSE	the proton and the neutron have essentially the same charge.
111. $^{13}_{6}C$ and $^{14}_{6}C$ are isotopes of the element carbon	BECAUSE	isotopes of an element have the same number of protons in the nucleus but have a different number of neutrons.
112. The Cu^{2+} ion needs to be oxidized to	BECAUSE	oxidation is a gain of electrons.

form Cu metal

113. The volume of a gas at 373 K and a pressure of 600 millimeters of mercury will be decreased at STP BECAUSE decreasing the temperature and increasing the pressure will cause the volume to decrease because $V_2 = V_1 \times \frac{P_1}{P_2} \times \frac{T_2}{T_1}$.

114. The pH of a 0.01 molar solution of HCl is 2 BECAUSE dilute HCl dissociates into two essentially ionic particles.

115. Nuclear fusion on the sun converts hydrogen to helium with a release of energy BECAUSE some mass is converted to energy in a solar fusion.

116. The water molecule is polar BECAUSE the radius of an oxygen atom is greater than that of a hydrogen atom.

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 is the approximate formula mass of $Ca(NO_3)_2$?

(A) 70
(B) 82
(C) 102
(D) 150
(E) 164

25. In the reaction $2KClO_3 + MnO_2 \rightarrow 2KCl + 3O_2\ (g) + MnO_2$, which substance is the catalyst?

(A) O_2
(B) $KClO_3$
(C) MnO_2
(D) KCl
(E) O_2 in the MnO_2

26. The normal configuration for ethyne (acetylene) is

(A) H—C=C—H

(B) H—C—C—H
(C) H—CH_2—CH_2—H
(D) H—C≡C—H
(E) H—CH—CH—H

27. According to the Kinetic-Molecular Theory, molecules increase in kinetic energy when they

(A) are mixed with other molecules at lower temperature
(B) are frozen into a solid
(C) are condensed into a liquid
(D) are heated to a higher temperature
(E) collide with each other in a container at a lower temperature

28. How many atoms are represented in the formula $Ca_3(PO_4)_2$?

(A) 5
(B) 8
(C) 9
(D) 12
(E) 13

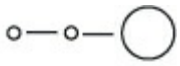
29. All of the following have covalent bonds EXCEPT

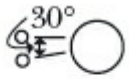
(A) HCl
(B) CCl_4
(C) H_2O
(D) CsF
(E) CO_2

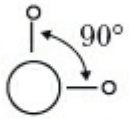
30. Which of the following is (are) the WEAKEST attractive force?

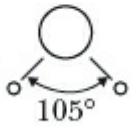
(A) Dipole-dipole forces
(B) Coordinate covalent bonding
(C) Covalent bonding
(D) Polar covalent bonding
(E) Ionic bonding

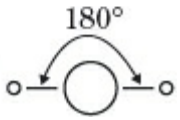
31. Which of these resembles the molecular structure of the water molecule?

(A) 

(B) 

(C) 

(D) 

(E) 

32. The two most important considerations in deciding whether a reaction will occur spontaneously are

(A) the stability and state of the reactants
(B) the energy gained and the heat evolved
(C) a negative value for ΔH and a positive value for ΔS
(D) a positive value for ΔH and a negative value for ΔS
(E) the endothermic energy and the structure of the products

33. The reaction of an acid such as HCl and a base such as NaOH always

(A) forms a precipitate
(B) forms a volatile product
(C) forms an insoluble salt and water
(D) forms a sulfate salt and water
(E) forms a salt and water

34. The oxidation number of sulfur in H_2SO_4 is

(A) +2
(B) +3
(C) +4
(D) +6
(E) +8

35. Which of the substances in the following reaction is being reduced?

$$FeO + CO \rightarrow Fe + CO_2$$

(A) Fe and C
(B) Fe
(C) CO_2
(D) C

(E) CO

36. Which of the following when placed into water will test as an acid solution?

I. $HCl(g) + H_2O$
II. Excess $H_3O^+ + H_2O$
III. $CuSO_4(s) + H_2O$

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

37. The property of matter that is independent of its surrounding conditions and position is

(A) volume
(B) density
(C) mass
(D) weight
(E) state

38. Where are the highest ionization energies found in the Periodic Table?

(A) Upper left corner
(B) Lower left corner
(C) Upper right corner
(D) Lower right corner
(E) Middle of transition elements

39. Which of the following pairs of compounds can be used to illustrate the Law of Multiple Proportions?

(A) NO and NO_2
(B) CH_4 and CO_2
(C) ZnO_2 and $ZnCl_2$
(D) NH_3 and NH_4Cl
(E) H_2O and HCl

40. In this equilibrium reaction: $A + B \rightleftharpoons AB$ + heat (in a closed container), how could the forward reaction rate be increased?

I. By increasing the concentration of AB
II. By increasing the concentration of A