

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 1) According to the Arrhenius concept, if  $\text{HNO}_3$  were dissolved in water, it would act as
- A) a base.
  - B) an acid.
  - C) a source of hydroxide ions.
  - D) a source of  $\text{H}^-$  ions.
  - E) a proton acceptor.
- 2) The name given to an aqueous solution of  $\text{HBr}$  is
- A) hydrogen bromide.
  - B) hydrobromic acid.
  - C) bromic acid.
  - D) bromous acid.
  - E) hypobromous acid.
- 3) Which one of the following is characteristic of a base?
- A) produces  $\text{H}_3\text{O}^+$  in water
  - B) has a sour taste
  - C) has a slippery, soapy feel
  - D) turns blue litmus red
  - E) is insoluble in water
- 4) According to the Bronsted-Lowry definition,
- A) an acid is a proton acceptor.
  - B) a base produces  $\text{H}^+$  ions in aqueous solutions.
  - C) a base is a proton donor.
  - D) a base is a proton acceptor.
  - E) an acid acts as the solvent.
- 5) Identify the Bronsted-Lowry acid in the following reaction.
- $$\text{H}_2\text{O} + \text{CO}_3^{2-} \rightarrow \text{HCO}_3^- + \text{OH}^-$$
- A)  $\text{H}_2\text{O}$                       B)  $\text{CO}_3^{2-}$                       C)  $\text{HCO}_3^-$                       D)  $\text{OH}^-$                       E)  $\text{H}_2\text{CO}_3$
- 6) The correct formula for sulfuric acid is
- A)  $\text{H}_2\text{SO}_4$ .                      B)  $\text{H}_2\text{SO}_3$ .                      C)  $\text{H}_2\text{SO}_4^-$ .                      D)  $\text{H}_2\text{SO}_3^-$ .                      E)  $\text{SO}_4^{2-}$ .

- 7) The name of  $\text{Al}(\text{OH})_3$  is
- A) aluminum trihydroxide.
  - B) monoaluminum trihydroxide.
  - C) aluminum hydroxide.
  - D) aluminum(III) hydroxide.
  - E) aluminum oxygen hydride.
- 8) Which of the following is the strongest acid?
- A)  $\text{H}_3\text{PO}_4$                   B)  $\text{NH}_4^+$                   C)  $\text{NaOH}$                   D)  $\text{H}_2\text{CO}_3$                   E)  $\text{HCl}$
- 9) Which of the following is correctly identified?
- A)  $\text{NH}_3$ , strong acid
  - B)  $\text{NaOH}$ , strong base
  - C)  $\text{HCl}$ , weak acid
  - D)  $\text{H}_2\text{CO}_3$ , strong acid
  - E)  $\text{Ca}(\text{OH})_2$ , weak base
- 10) Ammonium hydroxide is a weak base because
- A) it is a dilute solution.
  - B) it is only slightly soluble in water.
  - C) it cannot hold on to its hydroxide ions.
  - D) it dissociates only slightly in water.
  - E) it is completely ionized in aqueous solution.
- 11) An acid and base react to form a salt and water in a(n) \_\_\_\_\_ reaction.
- A) ionization                  B) dissociation                  C) oxidation                  D) neutralization                  E) reduction
- 12) In a neutralization reaction
- A) two acids react to form water.
  - B) water and a salt react to form an acid and a base.
  - C) an acid and a salt react to form water and a base.
  - D) a base and a salt react to form water and an acid.
  - E) an acid and a base react to form a salt and water.

- 13) Which of the following is the correctly balanced equation for the complete neutralization of  $\text{H}_3\text{PO}_4$  with  $\text{Ca}(\text{OH})_2$ ?
- A)  $\text{H}_3\text{PO}_4 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaHPO}_4 + 2\text{H}_2\text{O}$
- B)  $3\text{H}_3\text{PO}_4 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 5\text{H}_2\text{O}$
- C)  $\text{H}_3\text{PO}_4 + \text{Ca}(\text{OH})_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + \text{H}_2\text{O}$
- D)  $2\text{H}_3\text{PO}_4 + 3\text{Ca}(\text{OH})_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{H}_2\text{O}$
- E)  $4\text{H}_3\text{PO}_4 + 6\text{Ca}(\text{OH})_2 \rightarrow 2\text{Ca}_3(\text{PO}_4)_2 + 12\text{H}_2\text{O}$
- 14) The neutralization reaction between  $\text{Al}(\text{OH})_3$  and  $\text{HNO}_3$  produces the salt with the formula
- A)  $\text{H}_2\text{O}$ .                      B)  $\text{AlNO}_3$ .                      C)  $\text{AlH}_2$ .                      D)  $\text{Al}(\text{NO}_3)_3$ .                      E)  $\text{NO}_3\text{OH}$ .
- 15) How many moles of  $\text{H}_2\text{O}$  are produced when 1 mole of  $\text{Mg}(\text{OH})_2$  reacts with 1 mole of  $\text{H}_2\text{SO}_4$ ?
- A) 1                                      B) 2                                      C) 3                                      D) 4                                      E) 5
- 16) Which of the following is a neutralization reaction?
- A)  $\text{KCl} + \text{NaNO}_3 \rightarrow \text{KNO}_3 + \text{NaCl}$
- B)  $\text{HNO}_3 + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{KNO}_3$
- C)  $\text{H}_2\text{O} + \text{SO}_3 \rightarrow \text{H}_2\text{SO}_4$
- D)  $4\text{Na} + \text{O}_2 \rightarrow 2\text{Na}_2\text{O}$
- E)  $2\text{NO}_2 \rightarrow 2\text{NO} + \text{O}_2$
- 17) What is the molarity of a  $\text{KCl}$  solution made by diluting 75.0 mL of a 0.200 M solution to a final volume of 100. mL?
- A) 0.267 M                      B) 0.150 M                      C) 0.200 M                      D) 6.67 M                      E) 0.100 M
- 18) What volume of 2.5% (*m/v*)  $\text{KOH}$  can be prepared from 125 mL of a 5.0%  $\text{KOH}$  solution?
- A) 0.0040 mL                      B) 63 mL                      C) 0.10 mL                      D) 125 mL                      E) 250 mL
- 19) What volume of 0.10 M  $\text{NaOH}$  can be prepared from 250. mL of 0.30 M  $\text{NaOH}$ ?
- A) 0.075 L                      B) 0.25 L                      C) 0.75 L                      D) 0.083 L                      E) 750 L
- 20) What volume of a 2.00 M  $\text{KCl}$  solution is required to prepare 500. mL of a 0.100 M  $\text{KCl}$  solution?
- A) 0.0400 mL                      B) 25.0 mL                      C) 2.00 mL                      D)  $1.00 \times 10^4$  mL                      E)  $5.00 \times 10^2$  mL

- 21) What is the new mass/volume ( $m/v$ )% of a KOH solution that is prepared by diluting 110 mL of a 6% ( $m/v$ ) KOH solution to 330 mL?  
 A) 2%                      B) 1%                      C) 6%                      D) 12%                      E) 18%
- 22) A 25.0 mL sample of  $\text{H}_3\text{PO}_4$  requires 50.0 mL of 1.50 M NaOH for complete neutralization. What is the molarity of the acid?  

$$\text{H}_3\text{PO}_4 + 3\text{NaOH} \rightarrow \text{Na}_3\text{PO}_4 + 3\text{H}_2\text{O}$$
 A) 0.333 M                      B) 3.00 M                      C) 1.50 M                      D) 1.00 M                      E) 0.750 M
- 23) A 25.0 mL sample of  $\text{H}_2\text{SO}_4$  requires 20.0 mL of 2.00 M KOH for complete neutralization. What is the molarity of the acid?  

$$\text{H}_2\text{SO}_4 + 2\text{KOH} \rightarrow \text{K}_2\text{SO}_4 + 2\text{H}_2\text{O}$$
 A) 2.00 M                      B) 2.50 M                      C) 0.800 M                      D) 1.60 M                      E) 1.25 M
- 24) How many milliliters of 0.400 M NaOH are required to completely neutralize 20.0 mL of 0.200 M HCl?  
 A) 50.0 mL                      B) 40.0 mL                      C) 0.100 mL                      D) 20.0 mL                      E) 10.0 mL
- 25) How many milliliters of 0.200 M NaOH are required to completely neutralize 5.00 mL of 0.100 M  $\text{H}_3\text{PO}_4$ ?  
 A) 7.50 mL                      B) 2.50 mL                      C) 0.833 mL                      D) 5.00 mL                      E) 15.0 mL
- 26) How many milliliters of 0.100 M  $\text{Ba}(\text{OH})_2$  are required to neutralize 20.0 mL of 0.250 M HCl?  
 A) 100. mL                      B) 50.0 mL                      C) 25.0 mL                      D) 0.250 mL                      E) 0.50 mL
- 27) When a piece of magnesium metal is added to hydrochloric acid, what gas is produced?  
 A) oxygen                      B) chlorine                      C) nitrogen                      D) carbon dioxide                      E) hydrogen
- 28) How many mL of a 0.0100 M solution can be made from 100.0 mL of a 1.00 M solution of sodium chloride in water?  
 A) 100 mL                      B) 500 mL                      C) 1000 mL                      D) 5000 mL                      E) 10,000 mL

For the next two problems, consider the reaction in which magnesium reacts with an HCl solution .



- 29) If 2.00 g of Mg reacts completely with 50.0 mL of HCl solution, what is the molarity of the HCl solution?  
 A) 1.65 M                      B) 80.0 M                      C) 8.00 M                      D) 0.823 M                      E) 3.29 M
- 30) If 2.00 g of Mg reacts with an excess HCl solution, how many liters of hydrogen gas are produced at STP?  
 A) 3.69 L                      B) 1.84 L                      C) 5.53 L                      D) 22.4 L                      E) 0.165 L

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 31) The conjugate acid of  $\text{HPO}_4^{2-}$  is \_\_\_\_\_.

- 32) Is a solution of sodium phosphate in water acidic or basic?
- 33) In a titration experiment, a student used 24.13 mL of 0.111 M sodium hydroxide to neutralize 20.00 mL of a hydrochloric acid solution. What was the molarity of the acid solution?
- 34) A student had 2.0 L of a sodium hydroxide solution that had a concentration of 0.4000 M. The student needed to make 500 mL of a 0.1000 M solution. How many mL of the concentrated solution was needed?
- 35) A student had 5.0 L of a sulfuric acid solution available, that had a concentration of 1.000 M. The student needed to make 200.0 mL of a 0.2000 M solution. How much of the concentrated solution was needed?

**TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.**

- 36) An ammonium chloride solution should have an acidic pH.
- 37) Magnesium metal is not attacked by sulfuric acid solutions.
- 38) Sodium carbonate gives a basic solution in water.
- 39) For most reactions of acids with bases, the resulting products are a salt and water.

**MATCHING. Choose the item in column 2 that best matches each item in column 1.**

*Identify each of the following compounds as an acid, a base, or neither.*

- |                                    |            |
|------------------------------------|------------|
| 40) HCl                            | A) acid    |
| 41) NaOH                           | B) neither |
| 42) NH <sub>3</sub>                | C) base    |
| 43) H <sub>2</sub> SO <sub>4</sub> |            |
| 44) CO <sub>3</sub> <sup>2-</sup>  |            |
| 45) NaCl                           |            |
| 46) CN <sup>-</sup>                |            |
| 47) H <sub>2</sub> CO <sub>3</sub> |            |

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

- 48) The O-H bond in water is polar because
- A) it is an ionic bond.
- B) oxygen is much more electronegative than hydrogen.
- C) oxygen occupies more space than hydrogen.
- D) hydrogen is much more electronegative than oxygen.
- E) it is a hydrogen bond.

- 49) A hydrogen bond is
- A) an attraction between a hydrogen atom attached to N, O, or F and an N, O, or F atom.
  - B) a covalent bond between H and O.
  - C) an ionic bond between H and another atom.
  - D) a bond that is stronger than a covalent bond.
  - E) the polar O-H bond in water.
- 50) In a solution, the solvent
- A) is a liquid.
  - B) can be a liquid or gas.
  - C) can be a solid, liquid, or gas.
  - D) is never a solid.
  - E) is the substance present in the smallest concentration.
- 51) A solution is prepared by dissolving 2 g of KCl in 100 g of H<sub>2</sub>O. In this solution, H<sub>2</sub>O is the
- A) solute.
  - B) solvent.
  - C) solution.
  - D) solid.
  - E) ionic compound.
- 52) Oil does not dissolve in water because
- A) oil is polar.
  - B) oil is nonpolar.
  - C) water is nonpolar.
  - D) water is saturated.
  - E) oil is hydrated.
- 53) When KCl dissolves in water
- A) the Cl<sup>-</sup> ions are attracted to dissolved K<sup>+</sup> ions.
  - B) the Cl<sup>-</sup> ions are attracted to the partially negative oxygen atoms of the water molecule.
  - C) the K<sup>+</sup> ions are attracted to Cl<sup>-</sup> ions on the KCl crystal.
  - D) the K<sup>+</sup> ions are attracted to the partially negative oxygen atoms of the water molecule.
  - E) the K<sup>+</sup> ions are attracted to the partially positive hydrogen atoms of the water molecule.
- 54) Water is a polar solvent and hexane (C<sub>6</sub>H<sub>14</sub>) is a nonpolar solvent. Which of the following correctly describes the solubility of the solute?
- A) mineral oil, soluble in water
  - B) CaCl<sub>2</sub>, soluble in hexane
  - C) NaHCO<sub>3</sub>, soluble in water
  - D) CCl<sub>4</sub>, soluble in water
  - E) octane, soluble in water

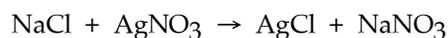
- 55) In water, a substance that ionizes completely in solution is called a
- A) weak electrolyte.
  - B) nonelectrolyte.
  - C) semiconductor.
  - D) nonconductor.
  - E) strong electrolyte.
- 56) An equivalent is
- A) the amount of ion that has a 1+ charge.
  - B) the amount of ion that has a 1- charge.
  - C) the amount of ion that carries 1 mole of electrical charge.
  - D) 1 mole of any ion.
  - E) 1 mole of an ionic compound.
- 57) How many equivalents are present in 5.0 g of  $\text{Al}^{3+}$ ?
- A) 15 Eq
  - B) 0.56 Eq
  - C) 0.19 Eq
  - D) 0.37 Eq
  - E) 3 Eq
- 58) When some of the sugar added to iced tea remains undissolved at the bottom of the glass, the solution is
- A) dilute.
  - B) polar.
  - C) nonpolar.
  - D) saturated.
  - E) unsaturated.
- 59) The solubility of KI is 50 g in 100 g of  $\text{H}_2\text{O}$  at  $20^\circ\text{C}$ . If 110 grams of KI are added to 200 grams of  $\text{H}_2\text{O}$ ,
- A) all of the KI will dissolve.
  - B) the solution will freeze.
  - C) the solution will start boiling.
  - D) a saturated solution will form.
  - E) the solution will be unsaturated.
- 60) Which one of the following compounds will NOT be soluble in water?
- A)  $\text{NaOH}$
  - B)  $\text{PbS}$
  - C)  $\text{K}_2\text{SO}_4$
  - D)  $\text{LiNO}_3$
  - E)  $\text{MgCl}_2$
- 61) Which one of the following compounds will be soluble in water?
- A)  $\text{AgCl}$
  - B)  $\text{Cu}(\text{OH})_2$
  - C)  $\text{LiCl}$
  - D)  $\text{CaSO}_4$
  - E)  $\text{PbCO}_3$

- 62) When solutions of  $\text{KCl}$  and  $\text{Pb}(\text{NO}_3)_2$  are mixed, a precipitate forms. Which of the following is the balanced equation for the double replacement reaction that occurs?
- A)  $\text{KCl}(aq) + \text{Pb}(\text{NO}_3)_2(aq) \rightarrow \text{KNO}_3(aq) + \text{PbCl}_2(s)$
- B)  $\text{KNO}_3(aq) + \text{PbCl}_2(s) \rightarrow \text{KCl}(aq) + \text{Pb}(\text{NO}_3)_2(aq)$
- C)  $\text{K}^+(aq) + \text{NO}_3^-(aq) \rightarrow \text{KNO}_3(aq)$
- D)  $2\text{KCl}(aq) + \text{Pb}(\text{NO}_3)_2(aq) \rightarrow 2\text{KNO}_3(aq) + \text{PbCl}_2(s)$
- E)  $\text{KCl}(aq) + \text{Pb}(\text{NO}_3)_2(aq) \rightarrow \text{KNO}_3(aq) + \text{PbCl}(s)$
- 63) The mass/mass percent concentration refers to
- A) grams of solute in 1 kg of solvent.
- B) grams of solute in 1 kg of solution.
- C) grams of solute in 100 g of solvent.
- D) grams of solute in 100 g of solution.
- E) grams of solvent in 100 g of solution.
- 64) What is the concentration, in  $m/m\%$ , of a solution prepared from 50.0 g  $\text{NaCl}$  and 150.0 g of water?
- A) 0.250%                      B) 33.3%                      C) 40.0%                      D) 25.0%                      E) 3.00%
- 65) Rubbing alcohol is 70.% isopropyl alcohol by volume. How many mL of isopropyl alcohol are in a 1 pint (473 mL) container?
- A) 70. mL                      B) 0.15 mL                      C) 680 mL                      D) 470 mL                      E) 330 mL
- 66) What volume (mL) of a 15% ( $m/v$ )  $\text{NaOH}$  solution contains 120 g  $\text{NaOH}$ ?
- A) 18 mL                      B) 0.13 mL                      C) 13 mL                      D) 120 mL                      E)  $8.0 \times 10^2$  mL
- 67) A solution of salt in water will have
- A) a lower freezing point than pure water.
- B) a lower boiling point than pure water.
- C) larger crystals when frozen than pure water.
- D) a lower density than pure water.
- E) a darker color than pure water.
- 68) What is the molarity of a solution that contains 17 g of  $\text{NH}_3$  in 0.50 L of solution?
- A) 34 M                      B) 2.0 M                      C) 0.50 M                      D) 0.029 M                      E) 1.0 M

- 69) The molarity (M) of a solution refers to  
 A) moles of solute/L of solution.  
 B) moles of solute/ L of solvent.  
 C) moles of solute/100 mL of solution.  
 D) grams of solute/100 mL of solution.  
 E) grams of solute/L of solution.
- 70) What is the molarity of a solution containing 5.0 moles of KCl in 2.0 L of solution?  
 A) 2.5 M                      B) 1.0 M                      C) 5.0 M                      D) 10. M                      E) 2.0 M
- 71) What is the molarity of a solution which contains 58.5 g of sodium chloride dissolved in 0.500 L of solution?  
 A) 0.500 M                      B) 1.00 M                      C) 1.50 M                      D) 2.00 M                      E) 4.00 M
- 72) How many moles of CaCl<sub>2</sub> are in 250 mL of a 3.0 M of CaCl<sub>2</sub> solution?  
 A) 750 moles                      B) 1.3 moles                      C) 83 moles                      D) 0.75 mole                      E) 3.0 moles
- 73) What volume of a 1.5 M KOH solution is needed to provide 3.0 moles of KOH?  
 A) 3.0 L                      B) 0.50 L                      C) 2.0 L                      D) 4.5 L                      E) 0.22 L
- 74) During the process of diluting a solution to a lower concentration,  
 A) the amount of solute does not change.  
 B) the amount of solvent does not change.  
 C) there is more solute in the concentrated solution.  
 D) the volume of the solution does not change.  
 E) water is removed from the concentrated solution.
- 75) The hydrate of calcium chloride has the formula CaCl<sub>2</sub>·2H<sub>2</sub>O. What is the mass of 1 mole of this compound?  
 A) 129 g/mole                      B) 147 g/mole                      C) 111 g/mole                      D) 199 g/mole                      E) 2000 g/mole

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 76) The number of moles of a compound dissolved in one liter of a solution is called the \_\_\_\_\_.
- 77) A substance that carries an electric current when dissolved in water is called a(n) \_\_\_\_\_ .
- 78) A substance that produces only a small number of ions in solution is known as a \_\_\_\_\_ electrolyte.
- 79) A solution of sodium carbonate, Na<sub>2</sub>CO<sub>3</sub>, that has a molarity of 0.0100 M contains \_\_\_\_\_ equivalents of carbonate per liter of the solution.
- 80) In the following equation, \_\_\_\_\_ will precipitate out of water solution.



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- 81) An example of kinetic energy is
- A) a coiled spring.
  - B) running water.
  - C) a tree.
  - D) natural gas.
  - E) chemical energy.
- 82) The energy associated with the motion of particles in a substance is called
- A) temperature.
  - B) electrical energy.
  - C) heat.
  - D) chemical energy.
  - E) potential energy.
- 83) Which of the following is an example of potential energy?
- A) chewing food
  - B) water stored in a reservoir
  - C) burning wood
  - D) a fan blade turning
  - E) riding an exercise bike
- 84) The phrase "ability to do work" is a definition of
- A) specific heat.
  - B) energy.
  - C) calorie.
  - D) heating.
  - E) cooling.
- 85) Which of the following represents a correct description of the energy change that actually occurs?
- A) Gas burned in a furnace is an example of kinetic energy being converted to thermal energy.
  - B) An athlete exercising is an example of mechanical energy being converted to heat energy.
  - C) Gasoline burned in an automobile is an example of kinetic energy being converted to mechanical energy.
  - D) The emission of light from the sun is an example of light energy being converted to heat energy.
  - E) An electrical fan which is running is an example of electrical energy being converted to mechanical energy.
- 86) When water from a dam is used to generate electricity,
- A) potential energy is converted to electrical energy.
  - B) kinetic energy is converted to potential energy.
  - C) thermal energy is converted to electrical energy.
  - D) chemical energy is converted to electrical energy.
  - E) electrical energy is converted to mechanical energy.

- 87) The energy stored in the chemical bonds of a carbohydrate molecule is
- A) specific heat.
  - B) kinetic energy.
  - C) potential energy.
  - D) work.
  - E) a calorie.
- 88) The energy of motion is referred to as
- A) work.
  - B) freezing.
  - C) specific heat.
  - D) potential energy.
  - E) kinetic energy.
- 89) When an electric oven is used, electrical energy is converted to
- A) heat energy.
  - B) magnetic energy.
  - C) solar energy.
  - D) radiant energy.
  - E) potential energy.
- 90) Global warming is believed to result from all of the following except
- A) burning of fossil fuels.
  - B) increasing levels of carbon dioxide in the atmosphere.
  - C) deforestation.
  - D) movement of the earth closer to the sun.
  - E) carbon dioxide trapping the heat produced by the sun.
- 91) How many calories are required to convert 16.5 g of ice at  $0.0^{\circ}\text{C}$  to liquid water at  $32.0^{\circ}\text{C}$ ? The heat of fusion of water is  $80.0\text{ cal/g}$ .
- A) 42,500 cal                  B) 530 cal                  C) 1850 cal                  D) 1320 cal                  E) 80.0 cal
- 92) The specific heat of a substance is the amount of heat needed to
- A) change 1 g of the substance from the solid to the liquid state.
  - B) raise the temperature of 1 g of the substance by  $1^{\circ}\text{C}$ .
  - C) change 1 g of the substance from the liquid to the solid state.
  - D) convert 1 g of a liquid to gas.
  - E) convert 1 g of a solid to a gas.
- 93) How many calories are required to raise the temperature of a 35.0 g sample of iron from  $25^{\circ}\text{C}$  to  $35^{\circ}\text{C}$ ? Iron has a specific heat of  $0.106\text{ cal/g}^{\circ}\text{C}$ .
- A) 37 cal                  B) 1.1 cal                  C) 3.7 cal                  D) 93 cal                  E) 130 cal

- 94) How many calories are required to increase the temperature of 13 g of alcohol from 11°C to 23°C? The specific heat of alcohol is 0.58 cal/g °C.
- A) 83 cal                      B) 0.63 cal                      C) 90. cal                      D) 0.54 cal                      E) 170 cal
- 95) Which of the following quantities is NOT required to calculate the amount of heat energy required to heat water from 25°C to 55°C?
- A) the mass of the water sample  
B) the initial temperature  
C) the final temperature  
D) the specific heat of water  
E) the heat of vaporization for water
- 96) Raising the temperature of 10.0 g of water from 10.0°C to 20.0°C requires 100.0 cal of energy, while raising the temperature of 10.0 g of aluminum from 10.0°C to 20.0°C requires 22 cal. More calories are required to heat the water because
- A) water is a liquid and aluminum is a solid at 10.0°C.  
B) ten grams of water occupies a larger volume than 10.0 g of aluminum.  
C) water has a greater potential energy than aluminum.  
D) water has a larger specific heat than aluminum.  
E) 10.0°C is closer to the melting point of water than to the melting point of aluminum.
- 97) The number of calories needed to raise the temperature of 32 g of water from 12°C to 54°C is
- A) 384 cal.                      B) 1.3 cal.                      C) 1300 cal.                      D) 1700 cal.                      E) 0.76 cal.
- 98) A 2.5 g sample of french fries is placed in a calorimeter with 500.0 g of water at an initial temperature of 21°C. After combustion of the french fries the water has a temperature of 48°C. What is the caloric value (kcal/g) of the french fries?
- A) 14 kcal/g                      B) 11 kcal/g                      C) 0.14 kcal/g                      D) 4.2 kcal/g                      E) 5.4 kcal/g
- 99) A potato contains 20 g of carbohydrate. If carbohydrate has a caloric value of 4 kcal/g, how many kcal are obtained from the carbohydrate in the potato?
- A) 5 kcal                      B) 20 kcal                      C) 40 kcal                      D) 60 kcal                      E) 80 kcal
- 100) Which of the following is a property of a solid?
- A) It takes the shape of the container.  
B) It fills the volume of the container.  
C) The particles move at a rapid rate.  
D) The interactions between its particles are very weak.  
E) The particles have fixed positions and are very close together.

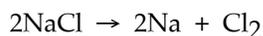
- 101) Which of the following is a physical property of both liquids and gases?
- A) has its own shape
  - B) has a definite volume
  - C) has strong interactions between its particles
  - D) has randomly arranged particles
  - E) has large spaces between molecules
- 102) Which one of the following properties describes a liquid?
- A) has its own shape
  - B) particles are close together and move randomly
  - C) particles move very rapidly
  - D) fills the entire volume of the container
  - E) There is essentially no interaction between the particles.
- 103) The physical state(s) present when a substance is melting is (are)
- A) solid.
  - B) liquid.
  - C) gas.
  - D) solid + liquid.
  - E) liquid + gas.
- 104) If the heat of fusion for water is 80.0 cal/g, how many calories are needed to melt 45.0 g of ice at 0°C?
- A) 3.60 cal
  - B)  $3.60 \times 10^3$  cal
  - C) 1.78 cal
  - D) 80.0 cal
  - E) 0.563 cal
- 105) When water is put into a closed container,
- A) all of the water will eventually evaporate.
  - B) condensation occurs more slowly than evaporation.
  - C) evaporation occurs more slowly than condensation.
  - D) there is no evaporation or condensation taking place.
  - E) the water level decreases slightly, then remains the same because evaporation and condensation occur at the same rate.
- 106) The formation of a gas resulting from the escape of high-energy particles from the surface of a liquid is known as
- A) evaporation.
  - B) deposition.
  - C) boiling.
  - D) melting.
  - E) sublimation.
- 107) When a solid is converted directly to a gas, the change of state is called
- A) freezing.
  - B) melting.
  - C) boiling.
  - D) condensation.
  - E) sublimation.
- 108) A burn from steam at 100°C is expected to be more severe than a burn from boiling water at 100°C because
- A) the steam is hotter than the boiling water.
  - B) there is more steam than water.
  - C) the steam will give off a large amount of heat as it condenses.
  - D) you are more likely to come into contact with the steam than with the boiling water.
  - E) All of these answers are correct.
- 109) How many calories are required to warm 15.0 g of water from 75°C to 100.0°C and convert it to steam at 100.0°C? The heat of vaporization of water is 540 cal/g.
- A) 375 cal
  - B) 8500 cal
  - C) 8100 cal
  - D) 410 cal
  - E) 540 cal

- 110) In order to calculate the total number of calories needed to melt 1 g of a solid and then convert it to a gas, you must know
- A) the specific heat of the substance.
  - B) the heat of fusion of the substance.
  - C) the heat of fusion and the specific heat of the substance.
  - D) the specific heat and the heat of vaporization of the substance.
  - E) the heat of fusion, the specific heat, and the heat of vaporization of the substance.
- 111) The heat of fusion for water is 80.0 cal/g, and the heat of vaporization of water is 540 cal/g. How many calories are required to convert 10.0 g of ice at 0°C to steam at 100°C?
- A) 620 cal                      B) 6,200 cal                      C) 720 cal                      D) 7,200 cal                      E) 5,400 cal
- 112) Which of the following does NOT involve a change of state?
- A) melting ice
  - B) freezing water
  - C) vaporization of alcohol
  - D) sublimation of dry ice
  - E) pouring water into a vacuum-insulated bottle
- 113) A heating curve illustrates
- A) what a substance looks like as it is heated.
  - B) what happens to the particles of a substance as it is heated.
  - C) what happens to the heat applied as the temperature is increased.
  - D) the changes in the temperature and physical state of a substance as it is heated.
  - E) the chemical changes that occur as the substance is heated.
- 114) Which of the following does NOT represent a step on the heating curve of water?
- A) The temperature of steam cannot exceed 100°C.
  - B) The temperature of ice remains at 0°C as it melts.
  - C) The temperature of liquid water increases linearly as it is heated.
  - D) The temperature of liquid water remains at 100°C as it boils.
  - E) Both liquid water and ice are present at 0°C.
- 115) In water, the melting point is unusually high because of
- A) covalent bonds in the individual molecules.
  - B) ionic bonds in the individual molecules.
  - C) hydrogen bonding between the molecules.
  - D) dispersion forces between the molecules.
  - E) the heat content of the hydrogen-oxygen bonds.
- 116) One cup of kidney beans contains 15 g of protein, 1 g of fat, and 42 g of carbohydrate. How many kilocalories, to two significant figures, does this sample contain?
- A) 60 kcal                      B) 88 kcal                      C) 230 kcal                      D) 240 kcal                      E) 520 kcal

- 117) In a liquid, the strength of the intermolecular interactions is considered  
A) very weak.      B) weak.      C) moderate.      D) strong.      E) very strong.
- 118) In a gas, the distance between the particles is  
A) very close relative to the size of the molecules.  
B) close relative to the size of the molecules.  
C) fixed relative to the size of the molecules.  
D) small relative to the size of the molecules.  
E) very large relative to the size of the molecules.
- 119) The specific heat of copper is  $0.093 \text{ cal/g } ^\circ\text{C}$ , and the specific heat of silver is  $0.057 \text{ cal/g } ^\circ\text{C}$ . If 100 cal of heat is added to one g of each metal at  $25^\circ\text{C}$ , what is the expected result?  
A) The copper will reach a higher temperature.  
B) The silver will reach a higher temperature.  
C) The two samples will reach the same temperature.  
D) The copper will reach a temperature lower than  $25^\circ\text{C}$ .  
E) The silver will soften.
- 120) Water has a boiling point of  $100^\circ\text{C}$ , and alcohol has a boiling point of  $78^\circ\text{C}$ , even though water is a smaller molecule. This large difference in boiling point is due to  
A) weak dispersion forces in the alcohol molecules.  
B) ionic bonds between the water molecules.  
C) covalent bonds in the ethanol molecules.  
D) stronger hydrogen bonds between the water molecules.  
E) stronger hydrogen bonds between the alcohol molecules.

**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

- 121) Is combustion an example of an oxidation or a reduction reaction?
- 122) The rule or principle that describes the effect of changing reaction conditions on an equilibrium is known as \_\_\_\_\_.
- 123) When an electric current is passed through molten salt, this reaction takes place.

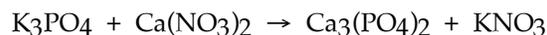


It is an example of a \_\_\_\_\_ reaction.

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

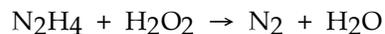
- 124) Which of the following is an example of a physical change?  
A) grinding coffee beans  
B) baking a cake  
C) converting water to hydrogen and oxygen  
D) digesting a cheeseburger  
E) burning coal

- 125) Which of the following would NOT be a physical change?
- A) freezing water to make ice cubes
  - B) tearing a piece of aluminum foil
  - C) boiling water for soup
  - D) burning gasoline in a lawnmower
  - E) melting gold to make jewelry
- 126) Which of the following is a chemical change?
- A) cutting a rope
  - B) bending a steel rod
  - C) making a snowman
  - D) burning sugar
  - E) melting gold
- 127) Which of the following is a physical change?
- A) baking a cake
  - B) dry ice subliming
  - C) fermenting grapes to produce wine
  - D) digesting a meal
  - E) a tomato ripening
- 128) A chemical equation is balanced when
- A) the total number of molecules is the same in reactants and products.
  - B) the total number of ions is the same in reactants and products.
  - C) the sum of the coefficients of the reactants is equal to the sum of the coefficients of the products.
  - D) the number of atoms of each element is the same in reactants and products.
  - E) the charge on each atom is the same in reactants and products.
- 129) Which of the following gives the balanced equation for this reaction?



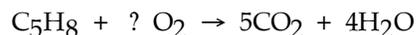
- A)  $\text{KPO}_4 + \text{CaNO}_3 + \text{KNO}_3$
- B)  $\text{K}_3\text{PO}_4 + \text{Ca}(\text{NO}_3)_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 3\text{KNO}_3$
- C)  $2\text{K}_3\text{PO}_4 + \text{Ca}(\text{NO}_3)_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{KNO}_3$
- D)  $2\text{K}_3\text{PO}_4 + 3\text{Ca}(\text{NO}_3)_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + 6\text{KNO}_3$
- E)  $\text{K}_3\text{PO}_4 + \text{Ca}(\text{NO}_3)_2 \rightarrow \text{Ca}_3(\text{PO}_4)_2 + \text{KNO}_3$

130) Which of the following correctly gives the best coefficients for the reaction below?



- A) 1, 1, 1, 1      B) 1, 2, 1, 4      C) 2, 4, 2, 8      D) 1, 4, 1, 4      E) 2, 4, 2, 4

131) What coefficient is placed in front of  $\text{O}_2$  to complete the balancing of the following equation?



- A) 1      B) 3      C) 5      D) 7      E) 9

132) What is the coefficient of hydrogen,  $\text{H}_2$ , when the following equation is balanced?



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

*Pentane ( $\text{C}_5\text{H}_{12}$ ) reacts with oxygen ( $\text{O}_2$ ) to form carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ) according to the following reaction. Answer the next three questions about this reaction.*



133) What is the coefficient for oxygen in the balanced equation?

- A) 2      B) 4      C) 5      D) 6      E) 8

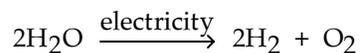
134) What is the coefficient for carbon dioxide in the balanced equation?

- A) 2      B) 4      C) 5      D) 6      E) 8

135) What is the coefficient for water in the balanced equation?

- A) 2      B) 4      C) 5      D) 6      E) 8

136) The following reaction takes place when an electric current is passed through water. It is an example of a \_\_\_\_\_ reaction.



- A) combination  
B) single replacement  
C) combustion  
D) decomposition  
E) double replacement

137) The following reaction is an example of a \_\_\_\_\_ reaction.



- A) displacement
- B) single replacement
- C) combustion
- D) decomposition
- E) double replacement

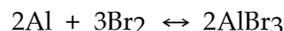
138) Which products would result from the double replacement reaction between  $\text{MgCl}_2(aq)$  and  $\text{Na}_2\text{CO}_3(aq)$ ?

- A)  $\text{Na}_2\text{Cl}_2(aq)$  and  $\text{MgCO}_3(s)$
- B)  $\text{NaCl}(aq)$  and  $\text{MgCO}_3(s)$
- C)  $\text{NaCl}(aq)$  and  $\text{Mg}_2\text{CO}_3(s)$
- D)  $\text{NaCl}(aq)$  and  $\text{Mg}(\text{CO}_3)_2(s)$
- E)  $\text{MgNa}_2(aq)$  and  $\text{CO}_3\text{Cl}_2(aq)$

139) Which of the following is an oxidation-reduction reaction?

- A)  $\text{CaCl}_2 + \text{Na}_2\text{SO}_4 \rightarrow \text{CaSO}_4 + 2\text{NaCl}$
- B)  $\text{KOH} + \text{HNO}_3 \rightarrow \text{H}_2\text{O} + \text{KNO}_3$
- C)  $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO}$
- D)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$
- E)  $\text{Al}_2(\text{SO}_4)_3 + 6\text{KOH} \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{K}_2\text{SO}_4$

140) What is oxidized and what is reduced in the following reaction?



- A) Al is oxidized and Br<sub>2</sub> is reduced.
- B) AlBr<sub>3</sub> is reduced and Br<sub>2</sub> is oxidized.
- C) Al is reduced and Br<sub>2</sub> is oxidized.
- D) AlBr<sub>3</sub> is reduced and Al is oxidized.
- E) AlBr<sub>3</sub> is oxidized and Al is reduced.

141) Which of the following describes an oxidation?

- A) loss of electrons or loss of oxygen
- B) loss of electrons or gain of oxygen
- C) loss of electrons or gain of hydrogen
- D) gain of electrons or gain of oxygen
- E) gain of electrons or loss of H

142) A catalyst is

- A) a reactant in a chemical reaction.
- B) a product in a chemical reaction.
- C) a substance that speeds up a reaction without being consumed in the reaction.
- D) a substance that increases the energy of the products.
- E) a substance that decreases the energy of the products.

143) When a reaction is at equilibrium,

- A) all reaction stops.
- B) no more reactants are converted to products.
- C) the reaction is no longer reversible.
- D) the forward and reverse reactions occur at the same rate.
- E) the products and reactants have the same energy content.

144) For the following equilibrium reaction, which cause and effect are correctly matched?



- A) add heat, shift right
- B) add CO, shift left
- C) remove CH<sub>3</sub>OH, shift left
- D) remove heat, no change
- E) remove H<sub>2</sub>, shift left

- 145) To make a chemical reaction occur, the activation energy is the energy that
- A) must be removed from the mixture.
  - B) must be released from the mixture.
  - C) initiates the reaction.
  - D) activates the catalyst.
  - E) is the difference in the energies of the starting materials and products.

- 146) A chemical reaction has reached equilibrium when
- A) the concentrations of reactants and products are equal.
  - B) all reactants have been converted to products.
  - C) all products have been removed from the reaction mixture.
  - D) the catalyst has been used up.
  - E) the rate of the forward reaction equals the rate of the reverse reaction.

- 147) In an oxidation–reduction reaction, the substance oxidized always
- A) takes on oxygen atoms.
  - B) shows a loss of electrons.
  - C) gives up hydrogen atoms.
  - D) shows a gain of electrons.
  - E) becomes a charged species.

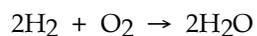
- 148) In this reaction, what is the substance oxidized?



- A) chlorine                      B) zinc chloride                      C) hydrogen                      D) Zn                      E) oxygen

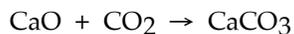
- 149) In an oxidation–reduction reaction, the substance reduced always
- A) takes on oxygen atoms.
  - B) shows a loss of electrons.
  - C) gives up hydrogen atoms.
  - D) shows a gain of electrons.
  - E) becomes a charged species.

- 150) In this reaction, what is the substance reduced?



- A) hydrogen
- B) oxygen
- C) water
- D) heat
- E) Reduction does not take place.

151) In this reaction, what is the coefficient for calcium oxide?

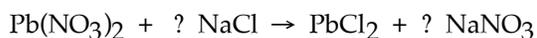


- A) 1                      B) 2                      C) 3                      D) 4                      E) 5

152) In this set of chemical reactions, which reaction is an oxidation–reduction reaction?

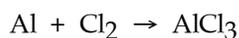
- A)  $\text{K}_2\text{SO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + 2\text{KCl}$   
B)  $\text{CuSO}_4 + \text{BaCl}_2 \rightarrow \text{BaSO}_4 + \text{CuCl}_2$   
C)  $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$   
D)  $\text{Pb}(\text{NO}_3)_2 + 2\text{NaCl} \rightarrow \text{PbCl}_2 + 2\text{NaNO}_3$   
E)  $\text{AgNO}_3 + \text{NaCl} \rightarrow \text{AgCl} + \text{NaNO}_3$

153) In this reaction, what is the correct coefficient for sodium chloride?



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

154) In the following reaction, what is the correct coefficient for aluminum chloride?



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

155) What is the classification for this reaction?

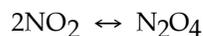


- A) decomposition  
B) combination  
C) replacement  
D) double replacement  
E) oxidation reduction

156) In a catalyzed chemical reaction, one function of a catalyst is to

- A) increase the number of successful reactant collisions.  
B) decrease the concentration of reactants.  
C) change the equilibrium concentrations of the products and reactants.  
D) increase the energy given off during the reaction.  
E) increase the temperature at which the reaction is carried out.

157) In the following reaction, what is the effect of adding more  $\text{NO}_2$  to the starting reaction mixture?



- A) It would make the reaction more endothermic.
- B) It would make the reaction more exothermic.
- C) It would slow the reaction down.
- D) It would decrease the final quantity of products.
- E) It would increase the final quantity of products.

158) The physiological equilibrium system that keeps the temperature of the body constant is called

- A) stimulation.      B) regulation.      C) metabolism.      D) homeostasis.      E) catalysis.

159) When you open a bottle of a soft drink and leave it open, the drink eventually goes flat. This happens because the equilibrium between carbonic acid and carbon dioxide shifts to produce

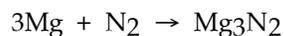
- A) more carbonic acid.
- B) more water.
- C) more oxygen.
- D) more carbon dioxide.
- E) more hydrogen ions.

160) The reaction of carbon with oxygen to produce carbon monoxide is an example of which class of reaction?



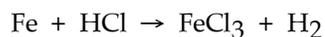
- A) single replacement
- B) double replacement
- C) combination
- D) catalytic
- E) endothermic

161) In the following reaction, oxidation occurs on which type of atom?



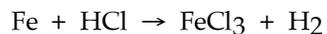
- A) magnesium                      B) nitrogen                      C) oxygen

162) For the following reaction, what is the correct coefficient for the  $\text{H}_2$ ?



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

163) What is the classification for this unbalanced reaction?



- A) combustion
  - B) combination
  - C) decomposition
  - D) single replacement
  - E) double replacement
- 164) Iron metal reacts with oxygen gas to produce iron(III) oxide. What will be the effect of increasing the pressure of oxygen gas in a closed reaction vessel?
- A) Less reaction will take place.
  - B) More iron oxide will be produced.
  - C) The reaction mixture will catch fire.
  - D) There is no effect; a catalyst is needed.
  - E) The rate of production of iron oxide will slow down.
- 165) Silver nitrate reacts with potassium chloride to produce solid silver chloride and what substance?
- A) nitrogen
  - B) oxygen
  - C) potassium metal
  - D) potassium nitrate
  - E) potassium nitrite
- 166) In any balanced chemical equation, the number of each type of atom on both sides of the equation is
- A) doubled.
  - B) the same.
  - C) decreased by one.
  - D) increased by one.
  - E) dependent on the temperature.
- 167) Magnesium reacts with oxygen gas to produce magnesium oxide, light, and heat. This reaction is
- A) an exothermic combination reaction.
  - B) an endothermic oxidation reaction.
  - C) an exothermic single replacement reaction.
  - D) an endothermic double replacement reaction.
  - E) an exothermic double replacement reaction.

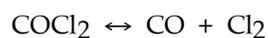
- 168) In the reaction of silver nitrate with copper metal, metallic silver comes out of solution, and the solution turns blue. The silver has undergone
- A) combustion.
  - B) decomposition.
  - C) oxidation.
  - D) reduction.
  - E) solution.

- 169) In the reaction of silver nitrate solution, which is colorless, with copper metal, metallic silver comes out of solution, and the solution turns blue. The blue of the new solution must be due to
- A) silver metal.
  - B) silver nitrate.
  - C) copper metal.
  - D) copper nitrate.
  - E) water.

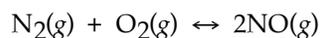
- 170) In the following reaction, what is the effect on the direction of the reaction if more  $\text{SO}_3$  is added to the reaction mixture?



- A) The equilibrium shifts to produce more products.
  - B) The position of the equilibrium remains unchanged.
  - C) The rate of formation of products is increased.
  - D) The equilibrium shifts to produce more reactants.
  - E) The catalyst for the reaction is used up.
- 171) In the following reaction,  $K_{\text{eq}}$  is much less than 1. At equilibrium, which of the following statements is true?



- A) The concentration of reactant is much greater than the concentration of products.
  - B) The concentration of products is much greater than the concentration of reactants.
  - C) The concentrations of products and reactants is approximately equal.
  - D) A catalyst will increase the concentration of products formed.
- 172) In the reaction of nitrogen gas with oxygen gas to produce nitric oxide, what is the effect of adding extra oxygen gas to the initial reaction mixture? The reaction is shown below.



- A) The equilibrium shifts to produce more  $\text{N}_2$ .
- B) The equilibrium shifts to produce more  $\text{NO}$ .
- C) The equilibrium is not affected.
- D) extra catalyst is required to reach equilibrium.
- E) The temperature of the reaction mixture is raised.

## Answer Key

Testname: UNTITLED1.TST

- 1) Answer: B  
ID: chem1t 10.1-1
- 2) Answer: B  
ID: chem1t 10.1-2
- 3) Answer: C  
ID: chem1t 10.1-4
- 4) Answer: D  
ID: chem1t 10.1-5
- 5) Answer: A  
ID: chem1t 10.1-6
- 6) Answer: A  
ID: chem1t 10.1-7
- 7) Answer: C  
ID: chem1t 10.1-8
- 8) Answer: E  
ID: chem1t 10.1-18
- 9) Answer: B  
ID: chem1t 10.1-19
- 10) Answer: D  
ID: chem1t 10.1-20
- 11) Answer: D  
ID: chem1t 10.1-21
- 12) Answer: E  
ID: chem1t 10.1-22
- 13) Answer: D  
ID: chem1t 10.1-23
- 14) Answer: D  
ID: chem1t 10.1-24
- 15) Answer: B  
ID: chem1t 10.1-25
- 16) Answer: B  
ID: chem1t 10.1-26
- 17) Answer: B  
ID: chem1t 10.1-35
- 18) Answer: E  
ID: chem1t 10.1-36

## Answer Key

Testname: UNTITLED1.TST

- 19) Answer: C  
ID: chem1t 10.1-37
- 20) Answer: B  
ID: chem1t 10.1-38
- 21) Answer: A  
ID: chem1t 10.1-39
- 22) Answer: D  
ID: chem1t 10.1-40
- 23) Answer: C  
ID: chem1t 10.1-41
- 24) Answer: E  
ID: chem1t 10.1-42
- 25) Answer: A  
ID: chem1t 10.1-43
- 26) Answer: C  
ID: chem1t 10.1-44
- 27) Answer: E  
ID: chem1t 10.1-47
- 28) Answer: E  
ID: chem1t 10.1-48
- 29) Answer: E  
ID: chem1t 10.1-50
- 30) Answer: B  
ID: chem1t 10.1-51
- 31) Answer:  $\text{H}_2\text{PO}_4^-$   
ID: chem1t 10.2-1
- 32) Answer: basic  
ID: chem1t 10.2-4
- 33) Answer: 0.134 M  
ID: chem1t 10.2-6
- 34) Answer: 125 mL  
ID: chem1t 10.2-7
- 35) Answer: 40.0 mL  
ID: chem1t 10.2-8
- 36) Answer: TRUE  
ID: chem1t 10.3-5

## Answer Key

Testname: UNTITLED1.TST

37) Answer: FALSE  
ID: chem1t 10.3-6

38) Answer: TRUE  
ID: chem1t 10.3-7

39) Answer: TRUE  
ID: chem1t 10.3-8

40) Answer: A  
ID: chem1t 10.4-1

41) Answer: C  
ID: chem1t 10.4-2

42) Answer: C  
ID: chem1t 10.4-3

43) Answer: A  
ID: chem1t 10.4-4

44) Answer: C  
ID: chem1t 10.4-5

45) Answer: B  
ID: chem1t 10.4-6

46) Answer: C  
ID: chem1t 10.4-7

47) Answer: A  
ID: chem1t 10.4-8

48) Answer: B  
ID: chem1t 9.1-1

49) Answer: A  
ID: chem1t 9.1-2

50) Answer: C  
ID: chem1t 9.1-3

51) Answer: B  
ID: chem1t 9.1-5

52) Answer: B  
ID: chem1t 9.1-6

53) Answer: D  
ID: chem1t 9.1-7

54) Answer: C  
ID: chem1t 9.1-8

## Answer Key

Testname: UNTITLED1.TST

- 55) Answer: E  
ID: chem1t 9.1-9
- 56) Answer: C  
ID: chem1t 9.1-10
- 57) Answer: B  
ID: chem1t 9.1-11
- 58) Answer: D  
ID: chem1t 9.1-13
- 59) Answer: D  
ID: chem1t 9.1-14
- 60) Answer: B  
ID: chem1t 9.1-16
- 61) Answer: C  
ID: chem1t 9.1-17
- 62) Answer: D  
ID: chem1t 9.1-18
- 63) Answer: D  
ID: chem1t 9.1-19
- 64) Answer: D  
ID: chem1t 9.1-20
- 65) Answer: E  
ID: chem1t 9.1-21
- 66) Answer: E  
ID: chem1t 9.1-24
- 67) Answer: A  
ID: chem1t 9.1-29
- 68) Answer: B  
ID: chem1t 9.1-40
- 69) Answer: A  
ID: chem1t 9.1-41
- 70) Answer: A  
ID: chem1t 9.1-42
- 71) Answer: D  
ID: chem1t 9.1-43
- 72) Answer: D  
ID: chem1t 9.1-44

## Answer Key

Testname: UNTITLED1.TST

- 73) Answer: C  
ID: chem1t 9.1-45
- 74) Answer: A  
ID: chem1t 9.1-46
- 75) Answer: B  
ID: chem1t 9.1-50
- 76) Answer: molarity  
ID: chem1t 9.3-6
- 77) Answer: electrolyte  
ID: chem1t 9.3-7
- 78) Answer: weak  
ID: chem1t 9.3-8
- 79) Answer: 0.0200  
ID: chem1t 9.3-9
- 80) Answer: AgCl  
ID: chem1t 9.3-3
- 81) Answer: B  
ID: chem1t 5.1-1
- 82) Answer: C  
ID: chem1t 5.1-2
- 83) Answer: B  
ID: chem1t 5.1-3
- 84) Answer: B  
ID: chem1t 5.1-4
- 85) Answer: E  
ID: chem1t 5.1-5
- 86) Answer: A  
ID: chem1t 5.1-6
- 87) Answer: C  
ID: chem1t 5.1-7
- 88) Answer: E  
ID: chem1t 5.1-8
- 89) Answer: A  
ID: chem1t 5.1-9
- 90) Answer: D  
ID: chem1t 5.1-10

## Answer Key

Testname: UNTITLED1.TST

- 91) Answer: C  
ID: chem1t 5.1-12
- 92) Answer: B  
ID: chem1t 5.1-13
- 93) Answer: A  
ID: chem1t 5.1-15
- 94) Answer: C  
ID: chem1t 5.1-16
- 95) Answer: E  
ID: chem1t 5.1-17
- 96) Answer: D  
ID: chem1t 5.1-18
- 97) Answer: C  
ID: chem1t 5.1-19
- 98) Answer: E  
ID: chem1t 5.1-20
- 99) Answer: E  
ID: chem1t 5.1-21
- 100) Answer: E  
ID: chem1t 5.1-25
- 101) Answer: D  
ID: chem1t 5.1-26
- 102) Answer: B  
ID: chem1t 5.1-27
- 103) Answer: D  
ID: chem1t 5.1-28
- 104) Answer: B  
ID: chem1t 5.1-29
- 105) Answer: E  
ID: chem1t 5.1-30
- 106) Answer: A  
ID: chem1t 5.1-31
- 107) Answer: E  
ID: chem1t 5.1-32
- 108) Answer: C  
ID: chem1t 5.1-33

## Answer Key

Testname: UNTITLED1.TST

- 109) Answer: B  
ID: chem1t 5.1-36
- 110) Answer: E  
ID: chem1t 5.1-37
- 111) Answer: D  
ID: chem1t 5.1-38
- 112) Answer: E  
ID: chem1t 5.1-39
- 113) Answer: D  
ID: chem1t 5.1-40
- 114) Answer: A  
ID: chem1t 5.1-41
- 115) Answer: C  
ID: chem1t 5.1-42
- 116) Answer: D  
ID: chem1t 5.1-43
- 117) Answer: D  
ID: chem1t 5.1-44
- 118) Answer: E  
ID: chem1t 5.1-45
- 119) Answer: B  
ID: chem1t 5.1-48
- 120) Answer: D  
ID: chem1t 5.1-49
- 121) Answer: oxidation  
ID: chem1t 6.3-2
- 122) Answer: LeChatelier's Principle  
ID: chem1t 6.3-3
- 123) Answer: decomposition  
ID: chem1t 6.3-4
- 124) Answer: A  
ID: chem1t 6.1-1
- 125) Answer: D  
ID: chem1t 6.1-2
- 126) Answer: D  
ID: chem1t 6.1-3

## Answer Key

Testname: UNTITLED1.TST

- 127) Answer: B  
ID: chem1t 6.1-4
- 128) Answer: D  
ID: chem1t 6.1-5
- 129) Answer: D  
ID: chem1t 6.1-6
- 130) Answer: B  
ID: chem1t 6.1-7
- 131) Answer: D  
ID: chem1t 6.1-8
- 132) Answer: C  
ID: chem1t 6.1-9
- 133) Answer: E  
ID: chem1t 6.1-10
- 134) Answer: C  
ID: chem1t 6.1-11
- 135) Answer: D  
ID: chem1t 6.1-12
- 136) Answer: D  
ID: chem1t 6.1-14
- 137) Answer: C  
ID: chem1t 6.1-15
- 138) Answer: B  
ID: chem1t 6.1-16
- 139) Answer: C  
ID: chem1t 6.1-17
- 140) Answer: A  
ID: chem1t 6.1-18
- 141) Answer: B  
ID: chem1t 6.1-19
- 142) Answer: C  
ID: chem1t 6.1-20
- 143) Answer: D  
ID: chem1t 6.1-21
- 144) Answer: E  
ID: chem1t 6.1-22

## Answer Key

Testname: UNTITLED1.TST

- 145) Answer: C  
ID: chem1t 6.1-23
- 146) Answer: E  
ID: chem1t 6.1-24
- 147) Answer: B  
ID: chem1t 6.1-25
- 148) Answer: D  
ID: chem1t 6.1-26
- 149) Answer: D  
ID: chem1t 6.1-27
- 150) Answer: B  
ID: chem1t 6.1-28
- 151) Answer: A  
ID: chem1t 6.1-29
- 152) Answer: C  
ID: chem1t 6.1-30
- 153) Answer: B  
ID: chem1t 6.1-31
- 154) Answer: B  
ID: chem1t 6.1-32
- 155) Answer: B  
ID: chem1t 6.1-33
- 156) Answer: A  
ID: chem1t 6.1-34
- 157) Answer: E  
ID: chem1t 6.1-35
- 158) Answer: D  
ID: chem1t 6.1-36
- 159) Answer: D  
ID: chem1t 6.1-37
- 160) Answer: C  
ID: chem1t 6.1-38
- 161) Answer: A  
ID: chem1t 6.1-39
- 162) Answer: C  
ID: chem1t 6.1-40

## Answer Key

Testname: UNTITLED1.TST

- 163) Answer: D  
ID: chem1t 6.1-41
- 164) Answer: B  
ID: chem1t 6.1-42
- 165) Answer: D  
ID: chem1t 6.1-43
- 166) Answer: B  
ID: chem1t 6.1-44
- 167) Answer: A  
ID: chem1t 6.1-45
- 168) Answer: D  
ID: chem1t 6.1-46
- 169) Answer: D  
ID: chem1t 6.1-47
- 170) Answer: D  
ID: chem1t 6.1-48
- 171) Answer: A  
ID: chem1t 6.1-49
- 172) Answer: B  
ID: chem1t 6.1-50