

- (1) Greenhouse gases affect the temperature of the earth by blocking sunlight from reaching earth. (1 point)

True

False

- (2) Stoichiometry is a chemist's version of following a recipe. (1 point)

True

False

- (3) Before determining conversion factors, it is necessary to make sure the equation is properly balanced. (1 point)

True

False

- (4) The conversion factor between mass and moles for a compound is the molar mass. (1 point)

True

False

- (5) The actual yield is the amount of product actually produced by a chemical reaction. (1 point)

True

False

- (6) The percent yield is calculated by dividing the actual yield by the theoretical yield times 100. (1 point)

True

False

- (7) The limiting reactant determines what the actual yield is. (1 point)

True

False

- (8) When viewing a chemical equation, the limiting reactant can never be a chemical on the product side of the equation. (1 point)

True

False

- (9) If the theoretical yield of a reaction is 144 grams and the actual yield of the reaction is 72 grams, the percent yield of the reaction is 200%. (1 point)

True

False

- (10) Bonding theories are used to predict how atoms bond together to form molecules. (1 point)

True

False

- (11) A chemical bond is classified as a covalent bond if it involves the transfer of electrons. (1 point)

True

False

- (12) Lewis structures only use the valence electrons in determining the bonding. (1 point)

True

False

- (13) Having eight valence electrons is very stable and is called an octet. (1 point)

True

False

- (14) The double bond is shorter and stronger than a single bond. (1 point)

True

False

- (15) Which of the following would be considered a theory? (2 points)

A) Glass is fragile.

B) Hot air rises.

C) Gasoline has a very strong odor.

D) Helium balloons float because helium is less dense than air.

(16) Which statement accurately describes the purpose of experiments? (2 points)

- A) Experiments are designed to produce the results predicted by a theory.
- B) Experiments can be replaced by a simple, logical reasoning of known facts.
- C) Experiments are designed to produce unexplainable results for further investigation.
- D) Experiments look for other observable predictions of a theory.
- E) none of the above

(17) What is the volume of 12.8 g of a liquid that has a density of 0.789 g/mL? (2 points)

- A) 12.8 mL
- B) 16.2 mL
- C) 10.7 mL
- D) 13.6 mL
- E) none of the above

(18) How many inches are in 6.32 cm? (2 points)

- A) 16.1
- B) 2.49
- C) 3.78
- D) 8.86
- E) none of the above

(19) How many significant digits should be reported in the answer to the following calculation? (2 points)

$$\frac{(13.21)(14.021)}{(2.00)} =$$

- A) 3
- B) 4
- C) 2
- D) 5
- E) none of the above

(20) How many grams of water (4.182 J/g°C) when supplied with 348 J of heat will gain a temperature of 5.2°C? (2 points)

- A) 15
- B) 17
- C) 19
- D) 16
- E) none of the above

(21) Given the table of specific heat values below, what is the identity of a 26.2 g metal sample that increases by 8.5°C when 100.0 J of energy is absorbed? (2 points)

<u>Element</u>	<u>Specific Heat(J/g°C)</u>
Au	0.128
Ag	0.235
Cu	0.385
Fe	0.449
Al	0.903

- A) Fe
- B) Al
- C) Au
- D) Ag
- E) none of the above

(22) The nucleus of an atom consists mainly of (2 points)

- A) neutrons and electrons.
- B) protons and electrons.
- C) protons and neutrons.
- D) protons, neutrons, and electrons.
- E) none of the above

(23) Isotopes are: (2 points)

- A) atoms of the same element that have different number of neutrons.
- B) atoms of the same element that have different number of protons.
- C) atoms of the same element that have different number of electrons.
- D) atoms of the same element that have the same number of neutrons.
- E) none of the above

(24) How many neutrons are found in Ne-21? (2 points)

- A) 11
- B) 21
- C) 10
- D) 0
- E) none of the above

(25) How many protons and neutrons are in Cl-37? (2 points)

- A) 20 protons, 17 neutrons
- B) 17 protons, 37 neutrons
- C) 17 protons, 20 neutrons
- D) 37 protons, 17 neutrons
- E) none of the above

(26) A fictional element named Nivadium is found to have three naturally occurring isotopes with the natural abundances shown here:

MASS (amu)	ABUNDANCE
22.1760	45.00%
23.1847	45.00%
24.1934	10.00%

The calculated atomic mass of Nivadium is (2 points)

- A) 7.61 amu
- B) 22.83 amu
- C) 23.18 amu
- D) 69.55 amu
- E) none of the above

(27) What is correct name of the compound whose formula is  $\text{BF}_3$ ? (2 points)

- A) boron trifluoride
- B) boron fluoride
- C) monoboron trifluorine
- D) boron(III) fluoride
- E) none of the above

(28) What is the correct formula for the molecular compound heptaphosphorus octafluoride? (2 points)

- A)  $\text{P}_5\text{F}_8$
- B)  $\text{P}_7\text{F}_6$
- C)  $\text{P}_6\text{F}_7$
- D)  $\text{P}_7\text{F}_8$
- E) none of the above

(29) What is the formula mass for diboron tetrachloride? (2 points)

- A) 127.98 amu
- B) 198.89 amu
- C) 234.34 amu
- D) 163.43 amu
- E) none of the above

(30) How many atoms of lithium are in 11.8 g? (2 points)

- A)  $1.35 \times 10^{24}$
- B)  $1.70 \times 10^{24}$
- C)  $1.02 \times 10^{24}$
- D)  $2.22 \times 10^{24}$
- E) none of the above

(31) How many moles of oxygen are in 3.70 moles of  $\text{NaClO}_4$ ? (2 points)

- A) 3.70
- B) 0.270
- C) 21.5
- D) 14.8
- E) none of the above

(32) What is the mass percent of Mg in magnesium chloride? (2 points)

- A) 12.3
- B) 40.7
- C) 25.6
- D) 68.3
- E) none of the above

(33) Given that sodium chloride is 39.0% sodium by mass, how many grams of sodium chloride are needed to have 750. mg of Na present? (2 points)

- A) 1.92
- B) 0.293
- C) 1,920
- D) 29.3
- E) none of the above

(34) Identify the double displacement reactions among the following: (2 points)

1.  $\text{KCl(aq)} + \text{AgNO}_3\text{(aq)} \rightarrow \text{AgCl(s)} + \text{KNO}_3\text{(aq)}$
2.  $\text{Na}_2\text{SO}_4\text{(aq)} + \text{BaCl}_2\text{(aq)} \rightarrow \text{BaSO}_4\text{(s)} + 2\text{NaCl(aq)}$
3.  $\text{H}_2\text{SO}_4\text{(aq)} + 2\text{NaOH(aq)} \rightarrow \text{Na}_2\text{SO}_4\text{(aq)} + 2\text{H}_2\text{O(l)}$

- A) 1 and 2 only
- B) 1 and 3 only
- C) 2 and 3 only
- D) All of 1, 2, and 3
- E) None of 1, 2, and 3

(35) Identify the oxidation-reduction reactions among the following: (2 points)

1.  $\text{Zn(s)} + \text{Cu}^{2+}\text{(aq)} \rightarrow \text{Zn}^{2+}\text{(aq)} + \text{Cu(s)}$
2.  $2\text{Na(s)} + \text{Cl}_2\text{(aq)} \rightarrow 2\text{NaCl(s)}$
3.  $2\text{Mg(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{MgO}$

- A) 1 and 2 only
- B) 1 and 3 only
- C) 2 and 3 only
- D) All of 1, 2, and 3
- E) None of 1, 2, and 3

(36) What is the net ionic equation for the reaction of hydrochloric acid with potassium hydroxide?  
(2 points)

- A)  $\text{H}^+ + \text{Cl}^- + \text{K}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^+ + \text{Cl}^-$
- B)  $\text{HCl} + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{KCl}$
- C)  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- D)  $2\text{H}^+ + 2\text{Cl}^- + \text{K}^{2+} + 2\text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^{2+} + 2\text{Cl}^-$
- E) none of the above

(37) What is the molecular equation for the reaction of hydrochloric acid with potassium hydroxide?  
(2 points)

- A)  $\text{H}_2\text{Cl} + 2\text{KOH} \rightarrow \text{H}_2\text{O} + 2\text{KCl}$
- B)  $2\text{HCl} + \text{K}(\text{OH})_2 \rightarrow 2\text{H}_2\text{O} + \text{KCl}_2$
- C)  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- D)  $\text{HCl} + \text{KOH} \rightarrow \text{H}_2\text{O} + \text{KCl}$
- E) none of the above

(38) What is the complete ionic equation for the reaction of hydrochloric acid with potassium hydroxide?  
(2 points)

- A)  $\text{H}^+ + \text{Cl}^- + \text{K}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^+ + \text{Cl}^-$
- B)  $\text{H}^+ + \text{Cl}^- + \text{K}^+ + \text{OH}^- \rightarrow 2\text{H}^+ + \text{O}^{2-} + \text{K}^+ + \text{Cl}^-$
- C)  $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
- D)  $2\text{H}^+ + 2\text{Cl}^- + \text{K}^{2+} + 2\text{OH}^- \rightarrow \text{H}_2\text{O} + \text{K}^{2+} + 2\text{Cl}^-$
- E) none of the above

(39) Which of the following is TRUE? (2 points)

- A) Stoichiometry shows the numerical relationship between chemical quantities in a balanced chemical equation.
- B) Stoichiometry allows prediction of the amounts of products that form in a chemical reaction based on the amounts of reactants.
- C) Stoichiometry allows prediction of how much of the reactants are necessary to form a given amount of product.
- D) All of the above are true.
- E) None of the above are true.

(40) Given the balanced equation  $\text{CH}_4 + 2 \text{O}_2 \rightarrow \text{CO}_2 + 2 \text{H}_2\text{O}$ , which of the following is NOT a correct conversion factor? (2 points)

- A) 2 mole  $\text{H}_2\text{O}$  = 18.02 g
- B) 1 mole  $\text{O}_2$  = 32.00 g
- C) 1 mole  $\text{CH}_4$  ✓ 2 mole  $\text{H}_2\text{O}$
- D) 2 mole  $\text{O}_2$  ✓ 1 mole  $\text{CO}_2$
- E) none of the above

(41) How many moles of water are made from complete reaction of 2.2 moles of oxygen gas with an excess of hydrogen gas? (2 points)

Given the reaction:  $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$

- A) 4.4
- B) 1.1
- C) 2.2
- D) 3.3
- E) not enough information

(42) How many moles of aluminum are needed to make 9 moles of molecular hydrogen? (2 points)

Given the reaction:  $2\text{Al} + 6\text{HCl} \rightarrow 2\text{AlCl}_3 + 3\text{H}_2$

- A) 2 moles
- B) 3 moles
- C) 4 moles
- D) 6 moles
- E) none of the above

(43) What is the theoretical yield of waffles if you have 6 cups of flour, 9 eggs and 2 tbs of oil?

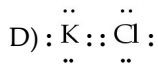
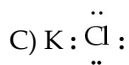
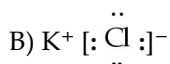
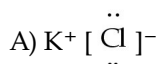
Given:  $2\text{ cups flour} + 3\text{ eggs} + 1\text{ tbs oil} \rightarrow 4\text{ waffles}$  (2 points)

- A) 10
- B) 12
- C) 8
- D) 4
- E) not enough information

(44) Which of the following statements about Lewis structures is FALSE? (2 points)

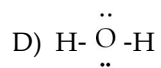
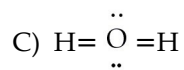
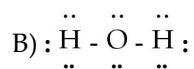
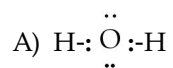
- A) An octet is when an atom has 8 valence electrons.
- B) A duet is a stable electron configuration for helium.
- C) An ionic bond occurs when electrons are transferred.
- D) A covalent bond occurs when electrons are shared.
- E) All of the above statements are true.

(45) Which Lewis structure below correctly represents KCl? (2 points)



- E) none of the above

(46) What is the correct Lewis structure for water? (2 points)



E) none of the above

(47) What was your favorite part of this course? What was the worst part? What would you do to make it better? (3 points Extra Credit)