General Chemistry I **Exam 2 Review**

____ 1. Balancing a chemical equation so that it obeys the law of conservation of matter requires:

a. Adjusting the coefficients in front of the formulas so there are the same number and type of atom on both sides of the equation.
b. Making sure the reactants and products are in the same phase.
c. Keeping the total charge the same on both sides of the equation.
d. Changing the formulas of the products and reactants.
e. Keeping the same number of molecules on both sides of the equation.

____ 2. Balance the following equation with the **smallest whole number coefficients**. What is the coefficient for O_2 in the balanced equation?

$C_4H_9SO + O_2 \rightarrow CO_2 + SO_2 + H_2O$

a. 54
b. 29
c. 23
d. 32
e. 27

____ 3. Balance the following equation with the **smallest whole number coefficients**. What is the coefficient for H_2O in the balanced equation?

$LiBF_4 + H_2O \rightarrow H_3BO_3 + HF + LiF$

a. 3
b. 2
c. 5
d. 6
e. 8

____ 4. When heated lead nitrate decomposes according to the following equation. What is the coefficient for NO_2 when the this equation is balanced with the **smallest whole number coefficients**?

$Pb(NO_3)_2 \rightarrow PbO + O_2 + NO_2$

a. 1
b. 2
c. 3
d. 4
e. 5

____ 5. Balance the following equation with the **smallest whole number coefficients**. Choose the answer that is the sum of the coefficients in the balanced equation. Do not forget coefficients of "one".

$Cr + H_2SO_4 \rightarrow Cr_2(SO_4)_3 + H_2$

a. 7
b. 9
c. 11
d. 13
e. 15

____ 6. Balance the following equation with the **smallest whole number coefficients**. Choose the answer that is the sum of the coefficients in the balanced equation. Do not forget coefficients of "one".

$CuSO_4 + NH_3 + H_2O \rightarrow (NH_4)_2SO_4 + Cu(NH_3)_4(OH)_2$

a. 8
b. 9
c. 11
d. 12
e. 14

____ 7. Ammonium nitrate fertilizer is sometimes used as an explosive. How many moles of water can be formed from the decomposition of 13.2 moles of ammonium nitrate?

$NH_4NO_3 \rightarrow N_2 + O_2 + H_2O$

a. 6.60
b. 14.0
c. 26.4
d. 13.2
e. 18.0

____ 8. Propane (C_3H_8) burns in oxygen to form CO_2 and H_2O according to the following equation. How many grams of O_2 are required to burn 3.01×10^{23} propane molecules?

$C_3H_8 + O_2 \rightarrow CO_2 + H_2O$

a. 80.0 g
b. 40.0 g
c. 160 g
d. 16.0 g
e. 64.0 g

____ 9. How many grams of magnesium are required to produce 5.000 kg of Si?

$SiCl_4 + Mg \rightarrow Si + MgCl_2$

a. 7595 g
b. 7581 g
c. 4327 g
d. 9999 g
e. 2164 g

____ 10. What mass of phosphoric acid, H_3PO_4, would actually react with 7.17 grams of LiOH?

$LiOH + H_3PO_4 \rightarrow Li_3PO_4 + H_2O$

a. 3.27 g
b. 6.53 g
c. 9.80 g
d. 19.6 g
e. 29.4 g

____ 11. What is the **total mass of products** formed when 3.2 grams of CH_4 is burned in air?

$CH_4 + O_2 \rightarrow CO_2 + H_2O$

a. 16 g
b. 36 g
c. 44 g
d. 80 g
e. 32 g

____ 12. The following statements apply to the interpretation of chemical equations. Not all of the statements are true. Which response includes all of the true statements, and no others?

I. The sum of the number of moles of the reactants must equal the sum of the number of moles of products in a balanced equation.
II. The sum of the number of grams of the reactants that react must equal the sum of the number of grams of the products produced by the reaction.
III. The following equation for the reaction involving hypothetical substances, A, B, C, and D, implies that the products C and D are **always** produced in a three to one mole ratio. $A + 2B \rightarrow 3C + D$
IV. The equation shown in III implies that in any reaction involving A and B as reactants, A must be the limiting reactant.
V. The total number of atoms in the reactants that react must always equal the total number of atoms in the products produced by the reaction.

a. I and V
b. I, II, and III
c. II, IV, and V
d. II, III, and V
e. III, IV, and V

____ 13. If 58 moles of NH_3 are combined with 32 moles of sulfuric acid, what is the limiting reactant and how much of the excess reactant is left over?

$NH_3 + H_2SO_4 \rightarrow (NH_4)_2SO_4$

a. H_2SO_4, 29 mol
b. NH_3, 1.0 mol
c. NH_3, 29 mol
d. NH_3, 3.0 mol
e. H_2SO_4, 3.0 mol

____ 14. What mass of $ZnCl_2$ can be prepared from the reaction of 1.69 grams of zinc with 1.10 grams of HCl?

$Zn + HCl \rightarrow ZnCl_2 + H_2$

a. 2.30 g
b. 2.27 g
c. 2.45 g
d. 2.06 g
e. 4.11 g

____ 15. A mixture of 13.1 g Zn and 22.0 g I_2 is reacted to completion in a closed, evacuated container. What are the contents of the container after this reaction?

$Zn + I_2 \rightarrow ZnI_2$

a. 27.7 g of ZnI_2 and 5.7 g of Zn
b. 63.9 g of ZnI_2 and 3.4 g of I_2
c. 63.9 g of ZnI_2
d. 27.7 g of ZnI_2 and 7.4 g of Zn
e. 31.2 g of ZnI_2 and 3.9 g of I_2

____ 16. What is the percent yield of CO_2 if the reaction of 10.0 grams of CO with excess O_2 produces 12.8 grams of CO_2?

$CO(g) + O_2(g) \rightarrow CO_2(g)$

a. 76.4%
b. 78.1%
c. 81.5%
d. 84.4%
e. 88.9%

____ 17. How many grams of PI_3 could be produced from 250. g of I_2 and excess phosphorus if the reaction gives a 98.5% yield?

$P_4 + I_2 \rightarrow PI_3$

a. 246 g
b. 254 g
c. 266 g
d. 270 g
e. 286 g

____ 18. What mass of silver nitrate, $AgNO_3$, is required to prepare 800. g of 3.50% solution of $AgNO_3$?
a. 24.6 g
b. 26.7 g
c. 27.0 g
d. 25.5 g
e. 28.0 g

____ 19. What mass of 30.0% $Ca(NO_3)_2$ solution contains 60.0 grams of water?
a. 42.0 g
b. 85.7 g
c. 58.0 g
d. 14.3 g
e. 62.4 g

____ 20. What volume of 40.0% $NaNO_3$ solution contains 0.15 mole of $NaNO_3$? Density = 1.32 g/mL.
a. 42.0 mL
b. 3.86 mL
c. 9.60 mL
d. 24.1 mL
e. 38.2 mL

____ 21. What is the molarity of 850. mL of a solution containing 46.2 grams of NaBr?
a. 0.495 *M*
b. 0.506 *M*
c. 0.516 *M*
d. 0.528 *M*
e. 0.545 *M*

____ 22. What mass of glucose (mw = 180 g/mol) must be dissolved in enough water to produce 1000. mL of 0.55 *M* glucose solution?
a. 99 g
b. 327 g
c. 0.099 g
d. 235 g
e. 99.0 g

____ 23. The specific gravity of commercial nitric acid solution is 1.42 and it is 70.0% HNO_3 by mass. Calculate its molarity.
a. 18.0 *M*
b. 15.8 *M*
c. 12.8 *M*
d. 99.4 *M*
e. 26.2 *M*

____ 24. A laboratory stock solution is 1.50 *M* NaOH. Calculate the volume of this stock solution that would be needed to prepare 300. mL of 0.200 *M* NaOH.
a. 2.25 mL
b. 10.0 mL
c. 40.0 mL
d. 1.00 mL
e. 0.100 mL

____ 25. Calculate the molarity of the resulting solution if 25.0 mL of 2.40 *M* HCl solution is diluted to 300. mL.
a. 0.200 *M*
b. 29.0 *M*
c. 2.00 *M*
d. 0.400 *M*
e. 0.0400 *M*

____ 26. Calculate the resulting molarity of a solution prepared by mixing 25.0 mL of 0.160 *M* NaBr and 55.0 mL of 0.0320 *M* NaBr.
a. 0.522 *M*
b. 0.272 *M*
c. 0.230 *M*
d. 0.0658 *M*
e. 0.0720 *M*

____ 27. A sample of commercial perchloric acid is 70.0% $HClO_4$ by mass; its density is 1.664 g/mL. How many milliliters of this concentrated $HClO_4$ would be required to prepare 500. mL of 1.50 *M* $HClO_4$ solution?
a. 33.0 mL
b. 45.3 mL
c. 54.1 mL
d. 64.7 mL
e. 78.6 mL

____ 28. Silver nitrate, $AgNO_3$, reacts with sodium chloride as indicated by the following equation. What mass of NaCl would be required to react with 200. mL of 0.200 *M* $AgNO_3$ solution?

$AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$

a. 0.117 g
b. 1.17 g
c. 2.34 g
d. 4.68 g
e. 3.06 g

____ 29. What volume of 0.150 molar KOH is required to react with 1.259 grams of oxalic acid, $(COOH)_2$?

$2KOH + (COOH)_2 \rightarrow K_2(COO)_2 + 2H_2O$

a. 93 mL
b. 27.9 mL
c. 186 mL
d. 147 mL
e. 372 mL

____ 30. If 40.0 mL of H_2SO_4 solution reacts with 0.212 gram of Na_2CO_3, what is the molarity of the H_2SO_4 solution?

$Na_2CO_3 + H_2SO_4 \rightarrow Na_2SO_4 + CO_2 + H_2O$

a. 0.50 *M*
b. 0.10 *M*
c. 0.20 *M*
d. 0.40 *M*
e. 0.050 *M*

____ 31. Witherite is a mineral that contains barium carbonate. If a 1.68-g sample of witherite were to react completely with 24.6 mL of 0.2558 *M* HCl, what would be the percent of barium carbonate in the witherite sample? (Barium carbonate is the only compound present that reacts with the hydrochloric acid.)

$BaCO_3 + 2HCl \rightarrow BaCl_2 + CO_2 + H_2O$

a. 74.2%
b. 37.0%
c. 62.1%
d. 23.4%
e. 13.5%

____ 32. Which of the following responses contains all the true statements and no others?

I. The elements at the far right of the periodic table, except the noble gases, have the greatest tendency to form anions.
II. The elements with the least tendency to form ions are those at the far left of the periodic table.
III. Bonds in compounds consisting of two adjacent elements in the periodic table are likely to be covalent.
IV. The elements at the far left of the periodic table possess poor electrical conductivity.

a. I and III
b. I, II, and IV
c. II and IV
d. I, II, and III
e. IV

____ 33. The chemical behavior of a group of elements is determined by the _____ of the atoms in the group.
a. mass numbers
b. atomic numbers
c. atomic weights
d. atomic mass units
e. Avogadro numbers

____ 34. Which of the following is a metalloid?
a. Cr
b. K
c. U
d. Si
e. Pb

____ 35. Which of the following is an alkali metal?
a. H
b. Cs
c. Fe
d. He
e. Sr

____ 36. Which one of the following is an alkaline earth metal?
a. potassium, K
b. magnesium, Mg
c. iron, Fe
d. tin, Sn
e. bismuth, Bi

____ 37. Which one of the following compounds is **not** a salt?
a. LiI
b. $Al(ClO_4)_3$
c. HI
d. $Fe(ClO_3)_3$
e. NH_4Br

____ 38. Which one of the following is a strong acid?
a. HF
b. HNO_3
c. CH_3COOH
d. H_2SO_3
e. H_2CO_3

____ 39. Which statement regarding nitric acid is false?

a. It only slightly ionizes in aqueous solution.
b. Its solutions conduct electricity.
c. It is soluble in water.
d. It is a strong electrolyte.
e. It produces H^+ and NO_3^- in aqueous solution.

____ 40. Which one of the following is a weak acid?

a. $HClO_4$
b. HCl
c. HBr
d. HI
e. CH_3COOH

____ 41. Which one of the following ionic hydroxides is a soluble base?

a. $Cu(OH)_2$
b. $Fe(OH)_2$
c. $Fe(OH)_3$
d. $Sr(OH)_2$
e. $Al(OH)_3$

____ 42. Which of the following statements about strong soluble bases is false?

a. They are all metal hydroxides.
b. They are classified as weak electrolytes.
c. They produce OH^- in aqueous solution.
d. Their solutions conduct electricity.
e. They are composed of either alkali metals or some of the more reactive alkaline earth metals.

____ 43. Which one of the following substances is **insoluble** in water?

a. RbOH
b. KSCN
c. $BaCO_3$
d. LiBr
e. Na_3PO_4

____ 44. Which one of the following compounds is **incorrectly** identified as to type of compound?

	Substance	Type of Compound
a.	KOH	strong base
b.	$HClO_4$	strong acid
c.	HNO_2	weak acid
d.	NH_3	insoluble base
e.	H_2SO_3	weak acid

____ 45. Which one of the following salts is soluble in water?

a. $KClO_3$
b. $BaSO_4$
c. Ag_3PO_4
d. CuS
e. $FeCO_3$

____ 46. Which response includes all of the following salts that are **insoluble** in water, and no others?

I. KI
II. AgBr
III. $(NH_4)_2CO_3$
IV. $Pb(CH_3COO)_2$
V. $PbSO_4$

a. II, III, and IV
b. I
c. II and V
d. III, IV, and V
e. II and IV

____ 47. Which response includes all of the following substances that are strong electrolytes, and no others?

I. CH_3COOH
II. NH_4Cl
III. $Cr(OH)_3$
IV. KOH

a. I and II
b. II and III
c. II and IV
d. I and IV
e. II, III, and I

____ 48. What is the **total ionic** equation for the following formula unit equation?

$BaCl_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaCl(aq)$

a. $[Ba^{2+}(aq)+Cl^-(aq)] + [Na^+(aq)+SO_4^{2-}(aq)] \rightarrow BaSO_4(s) + [Na^+(aq)+Cl^-(aq)]$
b. $[Ba^{2+}(aq)+2Cl^-(aq)] + [2Na^+(aq)+SO_4^{2-}(aq)] \rightarrow BaSO_4(s) + 2[Na^+(aq)+Cl^-(aq)]$
c. $[Ba^{2+}(aq)+2Cl^-(aq)] + 2[Na^+(aq)+SO_4^{2-}(aq)] \rightarrow BaSO_4(s) + 2[Na^+(aq)+Cl^-(aq)]$
d. $[Ba^{2+}(aq)+2Cl^-(aq)] + [Na^+(aq)+SO_4^{2-}(aq)] \rightarrow BaSO_4(s) + [Na^+(aq)+Cl^-(aq)]$
e. $Ba^{2+}(aq) + SO_4^{2-}(aq) \rightarrow BaSO_4(s)$

____ 49. What is (are) the spectator ion(s) in the following reaction?

$2HClO_3(aq) + Sr(OH)_2(aq) \rightarrow Sr(ClO_3)_2(aq) + 2H_2O(l)$

a. H^+, OH^-
b. H^+
c. Sr^{2+}, ClO_3^-
d. Sr^{2+}, OH^-
e. OH^-

____ 50. What is the **net ionic** equation for the following formula unit equation?

$Cu(NO_3)_2(aq) + H_2S(aq) \rightarrow CuS(s) + 2HNO_3(aq)$

a. $Cu^{2+}(aq) + H_2S(aq) \rightarrow CuS(s) + 2H^+(aq)$
b. $[Cu^{2+}(aq)+2NO_3^-(aq)] + H_2S(aq) \rightarrow CuS(s) + 2[H^+(aq)+2NO_3^-(aq)]$
c. $Cu^{2+}(aq) + 2H^+(aq) + S^{2-}(aq) \rightarrow CuS(s) + 2H^+(aq)$
d. $Cu^{2+}(aq) + S^{2-}(aq) \rightarrow CuS(s)$
e. $Cu^{2+}(aq) + 2NO_3^-(aq) + 2H^+(aq) + S^{2-}(aq) \rightarrow CuS(s) + 2H^+(aq) + 2NO_3^-(aq)$

____ 51. Determine the oxidation number of the underlined element in $Na\underline{Mn}O_4$.
a. +1
b. +6
c. +3
d. +7
e. +5

____ 52. Determine the oxidation number of the underlined element in $(NH_4)_2\underline{C}O_3$.
a. +1
b. +2
c. +3
d. +4
e. +6

____ 53. Determine the oxidation number of the underlined element in $H_2\underline{Cr}O_4$.
a. +1
b. +2
c. +3
d. +4
e. +6

____ 54. Determine the oxidation number of the underlined element in $H_2\underline{P}O_2^-$.
a. +1
b. +2
c. +3
d. +4
e. +5

____ 55. What are the oxidation numbers (oxidation states) of the elements in $K_2Cr_2O_7$?
a. K = +1, Cr = +7, O = -2
b. K = +1, Cr = +12, O = -2
c. K = +1, Cr = +6, O = -2
d. K = +1, Cr = +8, O = -2
e. K = +2, Cr = +6, O = -2

____ 56. Which of the following matched pairs of name and formula has an error?

	Formula	Name
a.	Cl_2O_7	dichlorine heptoxide
b.	As_4O_6	tetraarsenic oxide
c.	NO	nitrogen oxide
d.	SO_3	sulfur trioxide
e.	N_2O_5	dinitrogen pentoxide

____ 57. Which of the following matched pairs of name and formula has an error?

	Formula	Name
a.	H_2CO_3	carbonic acid
b.	H_2SO_3	sulfurous acid
c.	HNO_3	nitric acid
d.	$HClO_2$	hypochlorous acid
e.	$HBrO_3$	bromic acid

____ 58. Which of the following matched pairs of name and formula has an error?

	Formula	Name
a.	$LiClO_2$	lithium chlorite
b.	HIO_3	periodic acid
c.	$HClO_2$	chlorous acid
d.	HBrO	hypobromous acid
e.	$Sr(ClO_4)_2$	strontium perchlorate

____ 59. What is the correct name for NH_4ClO_3?

a. nitrogen chlorate
b. tetraammonium trichloride
c. ammonium chloride
d. tetraammonium chlorite
e. ammonium chlorate

____ 60. Which response contains all of the following that are oxidation-reduction reactions and no others?

I. $PCl_3(l) + 3H_2O(l) \rightarrow 3HCl(aq) + H_3PO_3(aq)$
II. $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$
III. $CaCO_3(s) + 2HClO_3(aq) \rightarrow Ca(ClO_3)_2(aq) + CO_2(g) + H_2O(l)$

a. I
b. II
c. III
d. II and III
e. I and II

____ 61. What is the oxidizing agent in the following reaction?

$8H^+(aq) + 3C_2H_5OH(aq) + Cr_2O_7^{2-}(aq) \rightarrow 2Cr^{3+}(aq) + 3C_2H_4O(aq) + 7H_2O(l)$

a. H^+
b. $Cr_2O_7^{2-}$
c. Cr^{3+}
d. C_2H_5OH
e. H_2O

____ 62. What is the reducing agent in the following reaction?

$Cu(s) + 4H^+(aq) + SO_4^{2-}(aq) \rightarrow Cu^{2+}(aq) + 2H_2O(l) + SO_2(g)$

a. Cu
b. H^+
c. SO_4^{2-}
d. Cu^{2+}
e. SO_2

____ 63. In the following reaction CO is _____.

$Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$

a. the oxidizing agent and is oxidized.
b. the oxidizing agent and is reduced.
c. the reducing agent and is oxidized.
d. the reducing agent and is reduced.
e. neither an oxidizing agent nor a reducing agent.

____ 64. Which of the following reactions is a combination reaction?
a. $AgNO_3(aq) + HCl(aq) \rightarrow AgCl(s) + HNO_3(aq)$
b. $Na_2O(s) + CO_2(g) \rightarrow Na_2CO_3(s)$
c. $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$
d. $2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$
e. $KOH(aq) + HCl(aq) \rightarrow KCl(aq) + H_2O(l)$

____ 65. Which of the following is <u>both</u> a combination reaction <u>and</u> a reduction-oxidation reaction?
a. $H_2CO_3(aq) \rightarrow CO_2(g) + H_2O(l)$
b. $Zn(s) + CuNO_3(aq) \rightarrow Cu(s) + ZnNO_3(aq)$
c. $Ca(OH)_2(aq) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$
d. $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
e. $CaO(s) + CO_2(g) \rightarrow CaCO_3(s)$

____ 66. Which of the following reactions is a decomposition reaction?
a. $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$
b. $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$
c. $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$
d. $2AgNO_3(aq) + Zn(s) \rightarrow 2Ag(s) + Zn(NO_3)_2(aq)$
e. $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$

____ 67. Which of the following is <u>both</u> a decomposition reaction <u>and</u> a reduction-oxidation reaction?
a. $H_2CO_3(aq) \rightarrow CO_2(g) + H_2O(l)$
b. $Zn(s) + CuNO_3(aq) \rightarrow Cu(s) + ZnNO_3(aq)$
c. $Ca(OH)_2(aq) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$
d. $2NH_4NO_3(s) \rightarrow 2N_2(g) + O_2(g) + 4H_2O(g)$
e. $CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$

____ 68. Which response includes all of the following that are displacement reactions, and no other reactions?

I. $P_4O_{10}(s) + 6Na_2O(s) \rightarrow 4Na_3PO_4(s)$
II. $2AgNO_3(aq) + Zn(s) \rightarrow 2Ag(s) + Zn(NO_3)_2(aq)$
III. $Ca(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + H_2(g)$
IV. $Fe(OH)_2(s) + 2HCl(aq) \rightarrow FeCl_2(aq) + 2H_2O(l)$

a. I and II
b. II and III
c. II and IV
d. I and III
e. I, III, and IV

____ 69. Which response includes all of the following that are displacement reactions, and no other reactions?

I. $2KBr(aq) + F_2(g) \rightarrow 2KF(aq) + Br_2(l)$
II. $N_2O_3(g) \xrightarrow{heat} NO(g) + NO_2(g)$
III. $PF_3(g) + F_2(g) \rightarrow PF_5(g)$
IV. $2Na(s) + 2\ H_2O(l) \xrightarrow{heat} 2NaOH(aq) + H_2(g)$

a. I and IV
b. I and II
c. II, III, and IV
d. II and IV
e. I, II, and IV

____ 70. Which one of the following ions would be displaced from aqueous solution by magnesium?

a. Ca^{2+}
b. Cu^{2+}
c. Li^{+}
d. K^{+}
e. Na^{+}

____ 71. Which response includes all of the following reactions that **will occur** in aqueous solution, and no others?

I. $2NaF(aq) + Cl_2(g) \rightarrow 2NaCl(aq) + F_2(g)$
II. $2NaCl(aq) + I_2(s) \rightarrow 2NaI(aq) + Cl_2(g)$
III. $2NaBr(aq) + Cl_2(g) \rightarrow 2NaCl(aq) + Br_2(l)$
IV. $2NaI(aq) + Br_2(l) \rightarrow 2NaBr(aq) + I_2(s)$
V. $2NaBr(aq) + I_2(s) \rightarrow 2NaI(aq) + Br_2(l)$

a. I, II, and III
b. III and IV
c. II, IV, and V
d. I and III
e. III, IV, and V

____ 72. Which of the following represents the net ionic reaction for all strong acid / strong base reactions that produce a soluble salt?

a. $2H^{+}(aq) + 2e- \rightarrow H_2(g)$
b. $2H^{+}(aq) + 2H_2O(l) \rightarrow 4OH^{-}(aq)$
c. $H^{+}(aq) + OH^{-}(aq) \rightarrow H_2O(l)$
d. $H_2O(l) + OH^{-}(aq) \rightarrow O_2(g) + 3/2H_2(g)$
e. $2H^{+}(aq) + O^{2-}(aq) \rightarrow 2H_2O(l)$

____ 73. Write the balanced **formula unit** equation for the complete reaction of barium hydroxide with perchloric acid. What is the coefficient of H_2O?

a. 1
b. 2
c. 3
d. 4
e. 5

____ 74. Identify the **net ionic** equation for the reaction of $HClO_2$ and lithium hydroxide.

a. $HClO_2(aq) + OH^{-}(aq) \rightarrow ClO_2^{-}(aq) + H_2O(l)$
b. $HClO_2(aq) + 2OH^{-}(aq) \rightarrow ClO_2^{-}(aq) + 2H_2O(l)$
c. $2HClO_2(aq) + Ba(OH)_2(aq) \rightarrow Ba(ClO_2)_2(aq) + 2H_2O(l)$
d. $H^{+}(aq) + OH^{-}(aq) \rightarrow H_2O(l)$
e. $2HClO_2(aq) + OH^{-}(aq) \rightarrow 2ClO_2^{-}(aq) + 2H_2O(l)$

____ 75. Will a precipitate form when 0.1 *M* aqueous solutions of $AgNO_3$ and NaCl are mixed? If a precipitate does form, **identify** the precipitate and give the **net ionic** equation for the reaction.

a. No precipitate forms.
b. AgCl precipitates. $Ag^{+}(aq) + Cl^{-}(aq) \rightarrow AgCl(s)$
c. Ag_3N precipitates. $6Ag^{+}(aq) + 2NO_3^{-}(aq) \rightarrow 2Ag_3N(s) + 3O_2(g)$
d. AgCl precipitates. $Ag^{+}(aq) + NaCl(aq) \rightarrow AgCl(s) + Na^{+}(aq)$
e. $NaNO_3$ precipitates. $NO_3^{-}(aq) + Na^{+}(aq) \rightarrow NaNO_3(s)$

____ 76. Will a precipitate form when 0.1 *M* aqueous solutions of NH_4NO_3 and NaBr are mixed? If it does form, **identify** the precipitate and give the **net ionic** equation for the reaction.

a. No precipitate forms.
b. $NaNO_3$ precipitates. $Na^{+}(aq) + NO_3^{-}(aq) \rightarrow NaNO_3(s)$
c. NH_4BrO_3 precipitates. $NH_4^{+}(aq) + NO_3^{-}(aq) + Br^{-}(aq) \rightarrow NH_4BrO_3(s) + N_2$
d. NH_4N precipitates. $2NH_4^{+}(aq) + 2NO_3^{-}(aq) \rightarrow 2NH_4N(s) + 3O_2(g)$
e. NH_4Br precipitates. $NH_4^{+}(aq) + Br^{-}(aq) \rightarrow NH_4Br(s)$

____ 77. Classify the following reaction by giving the reaction type that applies.

$2NiS(s) + 3O_2(g) \xrightarrow{heat} 2NiO(s) + 2SO_2(g)$

a. redox
b. combination
c. decomposition
d. displacement
e. metathesis

____ 78. Classify the following reaction by giving the reaction type that applies.

$2HI(aq) + Ba(OH)_2(aq) \rightarrow 2H_2O(l) + BaI_2(aq)$

a. redox
b. combination
c. decomposition
d. displacement
e. metathesis

____ 79. Classify the following reaction by giving **all** of these reaction type(s) that apply.

I. redox
II. combination
III. decomposition
IV. displacement
V. metathesis

$2PbO(s) + O_2(g) \rightarrow 2PbO_2(s)$

a. I and V
b. only II
c. I and II
d. only III
e. only V

____ 80. Classify the following reaction by giving **all** of these reaction type(s) that apply.

I. redox
II. combination
III. decomposition
IV. displacement
V. metathesis

$2H_2O_2(aq) \rightarrow 2H_2O(l) + O_2(g)$

a. I and III
b. only II
c. I and II
d. only IV
e. only V

General Chemistry I **Exam 2 Review**
Answer Section

MULTIPLE CHOICE

1. ANS: A PTS: 1 TOP: Chemical Equations
2. ANS: E PTS: 1 TOP: Chemical Equations
3. ANS: A PTS: 1 TOP: Chemical Equations
4. ANS: D PTS: 1 TOP: Chemical Equations
5. ANS: B PTS: 1 TOP: Chemical Equations
6. ANS: C PTS: 1 TOP: Chemical Equations
7. ANS: C PTS: 1 TOP: Calculations Based on Chemical Equations
8. ANS: A PTS: 1 TOP: Calculations Based on Chemical Equations
9. ANS: A PTS: 1 TOP: Calculations Based on Chemical Equations
10. ANS: C PTS: 1 TOP: Calculations Based on Chemical Equations
11. ANS: A PTS: 1 TOP: Calculations Based on Chemical Equations
12. ANS: D PTS: 1 TOP: The Limiting Reactant Concept
13. ANS: D PTS: 1 TOP: The Limiting Reactant Concept
14. ANS: D PTS: 1 TOP: The Limiting Reactant Concept
15. ANS: D PTS: 1 TOP: The Limiting Reactant Concept
16. ANS: C PTS: 1 TOP: Percent Yields from Chemical Reactions
17. ANS: C PTS: 1 TOP: Percent Yields from Chemical Reactions
18. ANS: E PTS: 1 TOP: Concentrations of Solutions
19. ANS: B PTS: 1 TOP: Concentrations of Solutions
20. ANS: D PTS: 1 TOP: Concentrations of Solutions
21. ANS: D PTS: 1 TOP: Concentrations of Solutions
22. ANS: A PTS: 1 TOP: Concentrations of Solutions
23. ANS: B PTS: 1 TOP: Concentrations of Solutions
24. ANS: C PTS: 1 TOP: Dilution of Solutions
25. ANS: A PTS: 1 TOP: Dilution of Solutions
26. ANS: E PTS: 1 TOP: Dilution of Solutions
27. ANS: D PTS: 1 TOP: Dilution of Solutions
28. ANS: C PTS: 1 TOP: Using Solutions in Chemical Reactions
29. ANS: C PTS: 1 TOP: Using Solutions in Chemical Reactions
30. ANS: E PTS: 1 TOP: Using Solutions in Chemical Reactions
31. ANS: B PTS: 1 TOP: Using Solutions in Chemical Reactions
32. ANS: A PTS: 1 TOP: The Periodic Table: Metals | Nonmetals | and Metalloids
33. ANS: B PTS: 1 TOP: The Periodic Table: Metals | Nonmetals | and Metalloids
34. ANS: D PTS: 1 TOP: The Periodic Table: Metals | Nonmetals | and Metalloids
35. ANS: B PTS: 1 TOP: The Periodic Table: Metals | Nonmetals | and Metalloids
36. ANS: B PTS: 1 TOP: The Periodic Table: Metals | Nonmetals | and Metalloids
37. ANS: C PTS: 1 TOP: Aqueous Solutions-An Introduction
38. ANS: B PTS: 1 TOP: Aqueous Solutions-An Introduction
39. ANS: A PTS: 1 TOP: Aqueous Solutions-An Introduction
40. ANS: E PTS: 1 TOP: Aqueous Solutions-An Introduction
41. ANS: D PTS: 1 TOP: Aqueous Solutions-An Introduction
42. ANS: B PTS: 1 TOP: Aqueous Solutions-An Introduction
43. ANS: C PTS: 1 TOP: Aqueous Solutions-An Introduction
44. ANS: D PTS: 1 TOP: Aqueous Solutions-An Introduction
45. ANS: A PTS: 1 TOP: Aqueous Solutions-An Introduction

46. ANS: C PTS: 1 TOP: Aqueous Solutions-An Introduction
47. ANS: C PTS: 1 TOP: Aqueous Solutions-An Introduction
48. ANS: B PTS: 1 TOP: Reactions in Aqueous Solutions
49. ANS: C PTS: 1 TOP: Reactions in Aqueous Solutions
50. ANS: A PTS: 1 TOP: Reactions in Aqueous Solutions
51. ANS: D PTS: 1 TOP: Oxidation Numbers
52. ANS: D PTS: 1 TOP: Oxidation Numbers
53. ANS: E PTS: 1 TOP: Oxidation Numbers
54. ANS: A PTS: 1 TOP: Oxidation Numbers
55. ANS: C PTS: 1 TOP: Oxidation Numbers
56. ANS: B PTS: 1 TOP: Naming Binary Compounds
57. ANS: D PTS: 1 TOP: Naming Ternary Acids and Their Salts
58. ANS: B PTS: 1 TOP: Naming Ternary Acids and Their Salts
59. ANS: E PTS: 1 TOP: Naming Binary and Ternary Compounds
60. ANS: B PTS: 1 TOP: Oxidation-Reduction Reactions-An Introduction
61. ANS: B PTS: 1 TOP: Oxidation-Reduction Reactions-An Introduction
62. ANS: A PTS: 1 TOP: Oxidation-Reduction Reactions-An Introduction
63. ANS: C PTS: 1 TOP: Oxidation-Reduction Reactions-An Introduction
64. ANS: B PTS: 1 TOP: Combination Reactions
65. ANS: D PTS: 1 TOP: Combination Reactions
66. ANS: E PTS: 1 TOP: Decomposition Reactions
67. ANS: D PTS: 1 TOP: Decomposition Reactions
68. ANS: B PTS: 1 TOP: Displacement Reactions
69. ANS: A PTS: 1 TOP: Displacement Reactions
70. ANS: B PTS: 1 TOP: Displacement Reactions
71. ANS: B PTS: 1 TOP: Displacement Reactions
72. ANS: C PTS: 1 TOP: Metathesis (Acid-Base) Reactions
73. ANS: B PTS: 1 TOP: Metathesis (Acid-Base) Reactions
74. ANS: A PTS: 1 TOP: Metathesis (Acid-Base) Reactions
75. ANS: B PTS: 1 TOP: Metathesis (Precipitation) Reactions
76. ANS: A PTS: 1 TOP: Metathesis (Precipitation) Reactions
77. ANS: A PTS: 1 TOP: Summary of Reaction Types
78. ANS: E PTS: 1 TOP: Summary of Reaction Types
79. ANS: C PTS: 1 TOP: Summary of Reaction Types
80. ANS: A PTS: 1 TOP: Summary of Reaction Types