

Name: _____ Class: _____ Date: _____

Instructions: Answer the following questions. Show ALL work for problems to receive full credit. Make sure to include proper units and significant figures for all answers.

[3 pt] 1. What is the molecular weight of $\text{Al}(\text{C}_2\text{H}_3\text{O}_2)_3$ 1. _____[3 pt] 2. What is the molecular weight of $\text{Sc}_2(\text{C}_2\text{O}_4)_3$ 2. _____[5 pt] 3. What is the molecular weight of $(\text{NH}_4)_2\text{CO}_3$ 3. _____[3 pt] 4. What is the Molecular Weight of $\text{Ca}_3(\text{PO}_4)_2$? 4. _____[4 pt] 5. How many mols of $\text{Ca}_3(\text{PO}_4)_2$ are in 100.0 grams of $\text{Ca}_3(\text{PO}_4)_2$? 5. _____[5 pt] 6. How much (in milligrams) does 25.5 mols of $\text{Ca}_3(\text{PO}_4)_2$ weigh? 6. _____[5 pt] 7. How many grams does 3.7×10^{24} molecules of $\text{Ca}_3(\text{PO}_4)_2$ weigh? 7. _____[5 pt] 8. How many atoms of Oxygen are in 130.5 grams of $\text{Ca}_3(\text{PO}_4)_2$ 8. _____[4 pt] 9. How many mols of $\text{Ca}_3(\text{PO}_4)_2$ are in 125.0 grams of $\text{Ca}_3(\text{PO}_4)_2$? 9. _____

CHE 101 - Practice Exam 3

[4 pt] 10. How much (in milligrams) does 12.5 mols of $\text{Ca}_3(\text{PO}_4)_2$ weigh? 10. _____

[4 pt] 11. How many grams does 2.4×10^{25} molecules of $\text{Ca}_3(\text{PO}_4)_2$ weigh? 11. _____

[5 pt] 12. How many atoms of Oxygen are in 240.5 grams of $\text{Ca}_3(\text{PO}_4)_2$ 12. _____

[5 pt] 13. What is the Molecular Weight of $\text{Al}_2(\text{SO}_4)_3$? 13. _____

[5 pt] 14. How many mols of $\text{Al}_2(\text{SO}_4)_3$ are in 195.0 grams of $\text{Al}_2(\text{SO}_4)_3$? 14. _____

[5 pt] 15. How much (in kilograms) does 125 mols of $\text{Al}_2(\text{SO}_4)_3$ weigh? 15. _____

[5 pt] 16. How many grams does 2.87×10^{25} molecules of $\text{Al}_2(\text{SO}_4)_3$ weigh? 16. _____

[5 pt] 17. How many mols of Sulfur are in 15.0 mL of Sulfur? 17. _____

CHE 101 - Practice Exam 3

[2 pt] 18. List the 7 elements that are always found as diatomics.

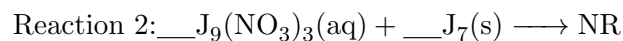
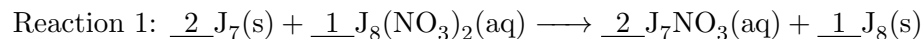
[2 pt] 19. List the (5) elements commonly found as gases (do not include the Noble gases) and (2) liquids.

[2 pt] 20. List the 8 small stable **molecular compounds** commonly found as gases.

[6 pt] 21. Write the complete chemical reaction for the 3 common decomposition reactions.

[5 pt] 22. List 5 signs that a chemical reaction has occurred (on paper or in lab).

[4 pt] 23. Jay was busy last night and discovered 3 more new elements (J7, J8, and J9). Given the following 2 reactions determine where they belong in the Activity Series. Explain.



CHE 101 - Practice Exam 3

- [4 pt] 24. ____ $\text{Al}(\text{OH})_3 (\text{s}) +$ ____ $(\text{NH}_4)_3\text{AsO}_4 (\text{aq}) \longrightarrow$ 24. _____
- [4 pt] 25. ____ $\text{Na} (\text{s}) +$ ____ $\text{Ag}_2\text{CO}_3 (\text{s}) \longrightarrow$ 25. _____
- [4 pt] 26. ____ $\text{C}_3\text{H}_8 +$ ____ $\text{O}_2 (\text{g}) \longrightarrow$ 26. _____
- [4 pt] 27. ____ $\text{H}_2\text{SO}_4 (\text{aq}) +$ ____ $\text{Mg}(\text{OH})_2 (\text{aq}) \longrightarrow$ 27. _____
- [4 pt] 28. ____ $\text{Ag} (\text{s}) +$ ____ $\text{MgI}_2 (\text{aq}) \longrightarrow$ 28. _____
- [4 pt] 29. ____ $\text{Na}_3\text{AsO}_4(\text{aq}) +$ ____ $\text{AgNO}_3(\text{aq}) \longrightarrow$ 29. _____
- [4 pt] 30. ____ $\text{Ba}(\text{NO}_3)_2(\text{aq}) +$ ____ $\text{K}_3\text{PO}_4(\text{aq}) \longrightarrow$ 30. _____
- [4 pt] 31. ____ $\text{NaCl}(\text{aq}) +$ ____ $\text{Mg}(\text{NO}_3)_2(\text{aq}) \longrightarrow$ 31. _____
- [4 pt] 32. ____ $\text{F}_2(\text{g}) +$ ____ $\text{KI}(\text{aq}) \longrightarrow$ 32. _____
- [4 pt] 33. ____ $\text{KOH}(\text{aq}) +$ ____ $\text{H}_3\text{PO}_4(\text{aq}) \longrightarrow$ 33. _____

CHE 101 - Practice Exam 3

- [3 pt] 34. $\text{___ MgBr}_2(\text{aq}) + \text{___ Cl}_2(\text{g}) \longrightarrow$ 34. _____
- [3 pt] 35. $\text{___ Na(s)} + \text{___ Al(NO}_3)_3(\text{aq}) \longrightarrow$ 35. _____
- [3 pt] 36. $\text{___ CH}_4(\text{g}) + \text{___ O}_2(\text{g}) \longrightarrow$ 36. _____
- [3 pt] 37. $\text{___ Na}_2\text{CO}_3(\text{aq}) + \text{___ HCl(aq)} \longrightarrow$ 37. _____
- [3 pt] 38. $\text{___ KCl(aq)} + \text{___ Ni(s)} \longrightarrow$ 38. _____
- [3 pt] 39. $\text{___ Ba(C}_2\text{H}_3\text{O}_2)_2(\text{aq}) + \text{___ MgCrO}_4(\text{aq}) \longrightarrow$ 39. _____
- [3 pt] 40. $\text{___ F}_2(\text{g}) + \text{___ HCl(aq)} \longrightarrow$ 40. _____
- [3 pt] 41. $\text{___ NH}_4\text{OH(aq)} + \text{___ H}_2\text{SO}_4(\text{aq}) \longrightarrow$ 41. _____
- [3 pt] 42. $\text{___ H}_3\text{PO}_4(\text{aq}) + \text{___ NaOH(aq)} \longrightarrow$ 42. _____
- [3 pt] 43. $\text{___ ZnSO}_4(\text{aq}) + \text{___ Mg(s)} \longrightarrow$ 43. _____

CHE 101 - Practice Exam 3

- [3 pt] 44. $\text{___ CoCl}_3(\text{aq}) + \text{___ NaC}_2\text{H}_3\text{O}_2(\text{aq}) \longrightarrow$ 44. _____
- [3 pt] 45. $\text{___ AgNO}_3(\text{aq}) + \text{___ PbCl}_2(\text{aq}) \longrightarrow$ 45. _____
- [3 pt] 46. $\text{___ C}_4\text{H}_{10}(\text{l}) + \text{___ O}_2(\text{g}) \longrightarrow$ 46. _____
- [3 pt] 47. $\text{___ Na}_2\text{CO}_3(\text{aq}) + \text{___ ZnBr}_2(\text{aq}) \longrightarrow$ 47. _____
- [3 pt] 48. $\text{___ NaOH}(\text{aq}) + \text{___ NH}_4\text{Cl}(\text{aq}) \longrightarrow$ 48. _____
- [3 pt] 49. $\text{___ C}_4\text{H}_{10}(\text{l}) + \text{___ O}_2(\text{g}) \longrightarrow$ 49. _____
- [3 pt] 50. $\text{___ KOH}(\text{aq}) + \text{___ (NH}_4\text{)}_2\text{C}_2\text{O}_4(\text{aq}) \longrightarrow$ 50. _____
- [3 pt] 51. $\text{___ HF}(\text{aq}) + \text{___ KOH}(\text{aq}) \longrightarrow$ 51. _____
- [3 pt] 52. $\text{___ I}_2(\text{s}) + \text{___ CaBr}_2(\text{aq}) \longrightarrow$ 52. _____
- [3 pt] 53. $\text{___ K}_2\text{SO}_3(\text{aq}) + \text{___ HBr}(\text{aq}) \longrightarrow$ 53. _____

CHE 101 - Practice Exam 3

[3 pt] 54. $\text{___ NaOH(aq)} + \text{___ H}_3\text{PO}_4\text{(aq)} \longrightarrow$ 54. _____

[3 pt] 55. $\text{___ CaCl}_2\text{(aq)} + \text{___ F}_2\text{(g)} \longrightarrow$ 55. _____

[3 pt] 56. $\text{___ K(s)} + \text{___ Ag}_2\text{CO}_3\text{(aq)} \longrightarrow$ 56. _____

[3 pt] 57. $\text{___ NaCl(aq)} + \text{___ HNO}_3\text{(aq)} \longrightarrow$ 57. _____

[3 pt] 58. $\text{___ C}_2\text{H}_5\text{OH(l)} + \text{___ O}_2\text{(g)} \longrightarrow$ 58. _____

[3 pt] 59. $\text{___ ZnSO}_4\text{(aq)} + \text{___ Ca(C}_2\text{H}_3\text{O}_2)_2\text{(aq)} \longrightarrow$ 59. _____

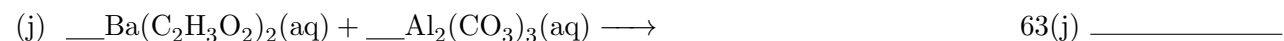
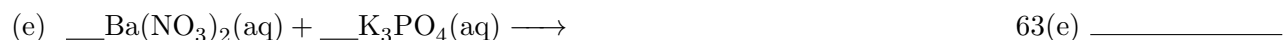
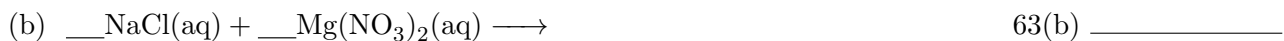
[3 pt] 60. $\text{___ Al(s)} + \text{___ HNO}_3\text{(aq)} \longrightarrow$ 60. _____

[3 pt] 61. $\text{___ MgCl}_2\text{(aq)} + \text{___ H}_2\text{CO}_3\text{(aq)} \longrightarrow$ 61. _____

[3 pt] 62. $\text{___ H}_2\text{SO}_4\text{(aq)} + \text{___ NaOH(aq)} \longrightarrow$ 62. _____

CHE 101 - Practice Exam 3

[48 pt] 63. Complete and balance the following reactions. Indicate the state (solid, liquid or gas) of the products when known. If heat is produced as a product include it. If no reaction occurs write NR in the answer blank.



CHE 101 - Practice Exam 3

[6 pt] 64. You work in sandwich shop! You have the following ingredients available: 35 slices of bread, 21 slices of ham, 50 slices of turkey and 15 slices of cheese. The following wonderful recipe is being used to make amazingly good sandwiches:

2 slices bread + 3 slices ham + 2 slice turkey + 1 slice of cheese \longrightarrow 1 amazing sandwich.

- (a) What is the limiting ingredient? 64(a) _____
- (b) Amount of Bread left: 64(b) _____
- (c) Amount of Ham left: 64(c) _____
- (d) Amount of Turkey left: 64(d) _____
- (e) Amount of Cheese left: 64(e) _____
- (f) Number of amazing sandwiches made: 64(f) _____

[6 pt] 65. Jay is baking apple pies using the following recipe: 3 Apples + 2 cups sugar + 5 teaspoons Cinnamon + 4 cups Flour \longrightarrow 2.5 apple pies. In my cupboard I have the following: 24 apples, 10 cups of Sugar, 30 teaspoons of Cinnamon and 25 cups of Flour. Answer the following questions:

- (a) What is the limiting ingredient? 65(a) _____
- (b) Amount of Apples left: 65(b) _____
- (c) Amount of Sugar left: 65(c) _____
- (d) Amount of Cinnamon left: 65(d) _____
- (e) Amount of Flour left: 65(e) _____
- (f) Number of pies made: 65(f) _____

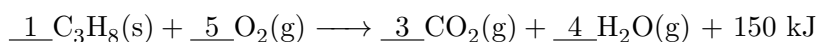
CHE 101 - Practice Exam 3

- [6 pt] 66. You work in pizza shop! You have the following available: 35 cups Pepperoni, 30 cups Italian sausage, 50 cups Mozzarella and 12 onions. The following wonderful recipe is being used to make amazingly good pizza:

2.5 cups Pepperoni + 1.5 cup Italian sausage + 3 cups Mozzarella + 1 onion \longrightarrow 5 amazing pizza's.

- (a) What is the limiting ingredient? 66(a) _____
- (b) Amount of Pepperoni left: 66(b) _____
- (c) Amount of Italian sausage left: 66(c) _____
- (d) Amount of Mozzarella left: 66(d) _____
- (e) Amount of Onions left: 66(e) _____
- (f) Number of amazing pizza's made: 66(f) _____

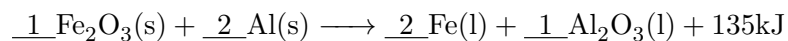
- [30 pt] 67. You perform a reaction in lab starting with 25.0 g of C_3H_8 and 50.0 g O_2 . Some useful MW: $\text{C}_3\text{H}_8 = 44.1 \text{ g/mol}$, $\text{O}_2 = 32.0 \text{ g/mol}$, $\text{CO}_2 = 44.0 \text{ g/mol}$ and $\text{H}_2\text{O} = 18.0 \text{ g/mol}$. Show CO₂ calculations in the space provided.



- (a) What is the limiting reactant? 67(a) _____
- (b) How many grams of the excess reagent will be left over? 67(b) _____
- (c) What is the theoretical yield in grams of CO_2 in grams? 67(c) _____
- (d) What is the percent yield if you performed the reaction and produced 23.0 grams of CO_2 ? 67(d) _____
- (e) How many Joules of heat will be released? 67(e) _____
- (f) How much H_2O will be produced? 67(f) _____
- (g) Does the reaction obey the Law of Conservation of Mass. Explain/prove your answer. 67(g) _____

CHE 101 - Practice Exam 3

[15 pt] 68. You perform a reaction in lab starting with 60.0 g of Fe_2O_3 and 50.0 g Al. Show all calculations in the space provided.



(a) What is the limiting reactant? 68(a) _____

(b) How many grams of the excess reagent will be left over? 68(b) _____

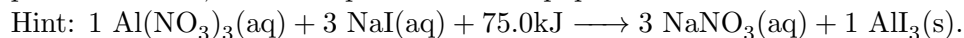
(c) What is the theoretical yield in grams of Fe in grams? 68(c) _____

(d) What is the percent yield if you performed the reaction and produced 23.0 grams of Fe? 68(d) _____

(e) How many Joules of heat will be released? 68(e) _____

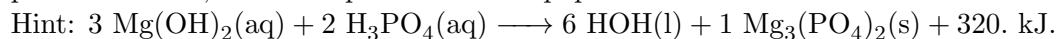
CHE 101 - Practice Exam 3

[12 pt] 69. Answer the following questions about the reaction below. Clearly label and show work in the space provided below, or on a separate sheet of paper.



- (a) What is the limiting reagent if you start with 15.0 grams of NaI and 10.0 grams of $\text{Al(NO}_3)_3$? 69(a) _____
- (b) What is the theoretical yield of AlI_3 in grams? 69(b) _____
- (c) How many grams of the excess reagent will be left over? 69(c) _____
- (d) What is the percent yield if you performed the reaction in lab and produced 12.50 grams of AlI_3 ? 69(d) _____
- (e) Is the reaction exothermic or endothermic? 69(e) _____
- (f) How much energy (in Joules) is consumed/produced in the reaction? 69(f) _____

[10 pt] 70. Answer the following questions about the reaction below. Clearly label and show work in the space provided below, or on a separate sheet of paper.



- (a) What is the limiting reagent if you start with 25.0 grams of Mg(OH)_2 and 25.0 grams of H_3PO_4 ? 70(a) _____
- (b) What is the theoretical yield in grams of $\text{Mg}_3(\text{PO}_4)_2$ in grams? 70(b) _____
- (c) How many grams of the excess reagent will be left over? 70(c) _____
- (d) What is the percent yield if you performed the reaction and produced 12.50 grams of $\text{Mg}_3(\text{PO}_4)_2$? 70(d) _____
- (e) Is the reaction exothermic or endothermic? 70(e) _____
- (f) How much energy (in Joules) is consumed/produced in the reaction? 70(f) _____

CHE 101 - Practice Exam 3

[5 pt] 71. Given the reaction: $\underline{2} \text{NaOH(aq)} + \underline{1} \text{H}_2\text{SO}_4\text{(aq)} \longrightarrow \underline{1} \text{Na}_2\text{SO}_4\text{(aq)} + \underline{2} \text{H}_2\text{O(l)}$ 71. _____
 how many grams of Na_2SO_4 can be produced from 25.0 grams of NaOH. Some useful
 MW: $\text{NaOH} = 40.0 \text{ g/mol}$, $\text{H}_2\text{SO}_4 = 98.0 \text{ g/mol}$, $\text{Na}_2\text{SO}_4 = 142.1 \text{ g/mol}$ and $\text{H}_2\text{O} =$
 18.0 g/mol .

[5 pt] 72. How many grams of H_2O can be produced by burning 38.75 grams of C_2H_6 ? 72. _____
 $\underline{2} \text{C}_2\text{H}_6\text{(g)} + \underline{7} \text{O}_2\text{(g)} \longrightarrow \underline{4} \text{CO}_2\text{(g)} + \underline{6} \text{H}_2\text{O(g)}$

[4 pt] 73. How many grams of NaOH are required to make 375 mL of 0.550 M NaOH? 73. _____

[5 pt] 74. What is the Molarity of a solution made from 35.0 g of Ca(OH)_2 added to 450.0 mL of 74. _____
 water?

[5 pt] 75. In a titration, it took 125.0 mL of 0.38 M H_3PO_4 to neutralize 55.0 mL of an unknown 75. _____
 concentration of Ca(OH)_2 . What is the concentration of the Ca(OH)_2 solution?
 $\underline{2} \text{H}_3\text{PO}_4\text{(aq)} + \underline{3} \text{Ca(OH)}_2\text{(aq)} \longrightarrow \underline{1} \text{Ca}_3\text{(PO}_4)_2\text{(aq)} + \underline{6} \text{H}_2\text{O}$

[5 pt] 76. How many mL of 0.350 M H_2SO_4 solution are required to neutralize 138.5 mL of 0.825 76. _____
 M NaOH solution?
 $\underline{1} \text{H}_2\text{SO}_4\text{(aq)} + \underline{2} \text{NaOH(aq)} \longrightarrow \underline{1} \text{Na}_2\text{SO}_4\text{(aq)} + \underline{2} \text{H}_2\text{O(l)}$

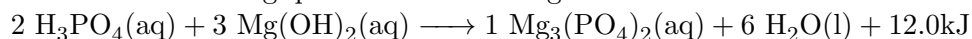
CHE 101 - Practice Exam 3

- [5 pt] 77. How many grams of H_2 gas can be produced if 75.0 g of Na are reacted with 600.0 mL of 3.25 M H_2SO_4 ? _____
- 2 Na(s) + 1 $\text{H}_2\text{SO}_4\text{(aq)}$ \longrightarrow 1 $\text{Na}_2\text{SO}_4\text{(aq)}$ + 1 $\text{H}_2\text{(g)}$

- [4 pt] 78. How many grams of HCl are required to make 750.0 mL of 3.000 M HCl? 78. _____

- [4 pt] 79. What is the molarity of a solution made from 15.0 grams of AgNO_3 dissolved in 275.0 mL of water? 79. _____

- [8 pt] 80. Answer the following questions about the given the reaction:



(a) How many grams of $\text{Mg}_3\text{(PO}_4)_2$ can be produced from 125.0 grams of Mg(OH)_2 . 80(a) _____

(b) How many grams of H_3PO_4 are required to react with 11.0 grams of Mg(OH)_2 . 80(b) _____

CHE 101 - Practice Exam 3

- [5 pt] 81. Bob performed a titration and noted that 75.0 mL of 0.65 M $\text{Mg}(\text{OH})_2$ completely neutralized 250.0 mL of HCl. What is the Molarity of the HCl solution?
Hint: $1 \text{ Mg}(\text{OH})_2(\text{aq}) + 2 \text{ HCl}(\text{aq}) \longrightarrow 2 \text{ HOH}(\text{l}) + \text{MgCl}_2(\text{aq})$. 81. _____
- [5 pt] 82. How many mL of 0.55 M NaOH are required to neutralize 195.0 mL of 1.87 M H_2SO_4 ?
Hint: $1 \text{ H}_2\text{SO}_4(\text{aq}) + 2 \text{ NaOH}(\text{aq}) \longrightarrow 2 \text{ HOH}(\text{l}) + 1 \text{ Na}_2\text{SO}_4(\text{aq})$. 82. _____
- [4 pt] 83. What is the molarity of a solution made from 25.0 grams of $\text{Mg}(\text{OH})_2$ dissolved in 175.0 mL of water? 83. _____
- [4 pt] 84. How many grams of HCl are required to make 105.0 mL of 2.75 M HCl? 84. _____
- [4 pt] 85. Given the reaction: $2 \text{ NaOH}(\text{aq}) + 1 \text{ H}_2\text{SO}_4(\text{aq}) \longrightarrow 1 \text{ Na}_2\text{SO}_4(\text{aq}) + 2 \text{ H}_2\text{O}(\text{l})$
how many grams of Na_2SO_4 can be produced from 25.0 grams of NaOH. 85. _____

CHE 101 - Practice Exam 3

- [5 pt] 86. Todd performed a titration and noted that 115.0 mL of 0.85 M $\text{Mg}(\text{OH})_2$ completely neutralized 135.0 mL of H_3PO_4 . What is the Molarity of the H_3PO_4 solution?

Hint: $3 \text{Mg}(\text{OH})_2(\text{aq}) + 2\text{H}_3\text{PO}_4(\text{aq}) \longrightarrow 6 \text{HOH}(\text{l}) + \text{Mg}_3(\text{PO}_4)_2(\text{s})$.

86. _____

- [5 pt] 87. How many mL of 3.25 M $\text{Mg}(\text{OH})_2$ are required to neutralize 240.0 mL of 1.25 M H_3PO_4 ?

Hint: $3 \text{Mg}(\text{OH})_2(\text{aq}) + 2 \text{H}_3\text{PO}_4(\text{aq}) \longrightarrow 6 \text{HOH}(\text{l}) + \text{Mg}_3(\text{PO}_4)_2(\text{s})$.

87. _____