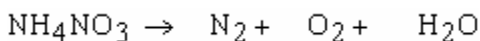


General Chemistry I

Exam 2 Review

- _____ 1. Balancing a chemical equation so that it obeys the law of conservation of matter requires:
- Adjusting the coefficients in front of the formulas so there are the same number and type of atom on both sides of the equation.
 - Making sure the reactants and products are in the same phase.
 - Keeping the total charge the same on both sides of the equation.
 - Changing the formulas of the products and reactants.
 - 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 O₂ in the balanced equation?
- $$\text{C}_4\text{H}_9\text{SO} + \text{O}_2 \rightarrow \text{CO}_2 + \text{SO}_2 + \text{H}_2\text{O}$$
- 54
 - 29
 - 23
 - 32
 - 27
- _____ 3. Balance the following equation with the **smallest whole number coefficients**. What is the coefficient for H₂O in the balanced equation?
- $$\text{LiBF}_4 + \text{H}_2\text{O} \rightarrow \text{H}_3\text{BO}_3 + \text{HF} + \text{LiF}$$
- 3
 - 2
 - 5
 - 6
 - 8
- _____ 4. When heated lead nitrate decomposes according to the following equation. What is the coefficient for NO₂ when this equation is balanced with the **smallest whole number coefficients**?
- $$\text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbO} + \text{O}_2 + \text{NO}_2$$
- 1
 - 2
 - 3
 - 4
 - 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".
- $$\text{Cr} + \text{H}_2\text{SO}_4 \rightarrow \text{Cr}_2(\text{SO}_4)_3 + \text{H}_2$$
- 7
 - 9
 - 11
 - 13
 - 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".
- $$\text{CuSO}_4 + \text{NH}_3 + \text{H}_2\text{O} \rightarrow (\text{NH}_4)_2\text{SO}_4 + \text{Cu}(\text{NH}_3)_4(\text{OH})_2$$
- 8
 - 9
 - 11
 - 12
 - 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?



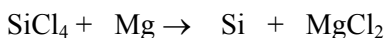
- | | |
|---------|---------|
| a. 6.60 | d. 13.2 |
| b. 14.0 | e. 18.0 |
| c. 26.4 | |

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?



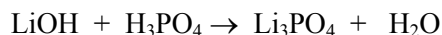
- | | |
|-----------|-----------|
| a. 80.0 g | d. 16.0 g |
| b. 40.0 g | e. 64.0 g |
| c. 160 g | |

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



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

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



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

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



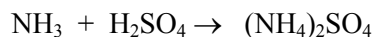
- | | |
|---------|---------|
| a. 16 g | d. 80 g |
| b. 36 g | e. 32 g |
| c. 44 g | |

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. $\text{A} + 2\text{B} \rightarrow 3\text{C} + \text{D}$
- 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.

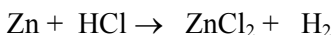
- a. I and V
- b. I, II, and III
- c. II, IV, and V
- d. II, III, and V
- e. III, IV, and V

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?



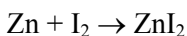
- a. H_2SO_4 , 29 mol
- b. NH_3 , 1.0 mol
- c. NH_3 , 29 mol
- d. NH_3 , 3.0 mol
- e. H_2SO_4 , 3.0 mol

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



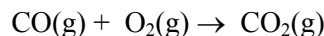
- a. 2.30 g
- b. 2.27 g
- c. 2.45 g
- d. 2.06 g
- e. 4.11 g

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?



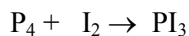
- a. 27.7 g of ZnI_2 and 5.7 g of Zn
- b. 63.9 g of ZnI_2 and 3.4 g of I_2
- c. 63.9 g of ZnI_2
- d. 27.7 g of ZnI_2 and 7.4 g of Zn
- e. 31.2 g of ZnI_2 and 3.9 g of I_2

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 ?



- 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?



- 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

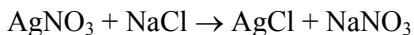
19. What mass of 30.0% $\text{Ca(NO}_3)_2$ solution contains 60.0 grams of water?

- a. 42.0 g
- b. 85.7 g
- c. 58.0 g
- d. 14.3 g
- e. 62.4 g

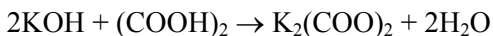
20. What volume of 40.0% NaNO_3 solution contains 0.15 mole of NaNO_3 ? Density = 1.32 g/mL.

- 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?
- 0.495 *M*
 - 0.506 *M*
 - 0.516 *M*
 - 0.528 *M*
 - 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?
- 99 g
 - 327 g
 - 0.099 g
 - 235 g
 - 99.0 g
23. The specific gravity of commercial nitric acid solution is 1.42 and it is 70.0% HNO₃ by mass. Calculate its molarity.
- 18.0 *M*
 - 15.8 *M*
 - 12.8 *M*
 - 99.4 *M*
 - 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.
- 2.25 mL
 - 10.0 mL
 - 40.0 mL
 - 1.00 mL
 - 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.
- 0.200 *M*
 - 29.0 *M*
 - 2.00 *M*
 - 0.400 *M*
 - 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.
- 0.522 *M*
 - 0.272 *M*
 - 0.230 *M*
 - 0.0658 *M*
 - 0.0720 *M*
27. A sample of commercial perchloric acid is 70.0% HClO₄ by mass; its density is 1.664 g/mL. How many milliliters of this concentrated HClO₄ would be required to prepare 500. mL of 1.50 *M* HClO₄ solution?
- 33.0 mL
 - 45.3 mL
 - 54.1 mL
 - 64.7 mL
 - 78.6 mL
28. Silver nitrate, AgNO₃, 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* AgNO₃ solution?



- 0.117 g
 - 1.17 g
 - 2.34 g
 - 4.68 g
 - 3.06 g
29. What volume of 0.150 molar KOH is required to react with 1.259 grams of oxalic acid, (COOH)₂?



- 93 mL
 - 27.9 mL
 - 186 mL
 - 147 mL
 - 372 mL
30. If 40.0 mL of H₂SO₄ solution reacts with 0.212 gram of Na₂CO₃, what is the molarity of the H₂SO₄ solution?



- a. $0.50 M$
b. $0.10 M$
c. $0.20 M$

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.)



- 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.

- I and III
- I, II, and IV
- II and IV
- I, II, and III
- 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 d. Si
b. K e. Pb
c. U

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(ClO₄)₃
c. HI
d. Fe(ClO₃)₃
e. NH₄Br

38. Which one of the following is a strong acid?

- a. HF
b. HNO₃
c. CH₃COOH

39. Which statement regarding nitric acid is false?
- It only slightly ionizes in aqueous solution.
 - Its solutions conduct electricity.
 - It is soluble in water.
 - It is a strong electrolyte.
 - It produces H^+ and NO_3^- in aqueous solution.
40. Which one of the following is a weak acid?
- HClO_4
 - HCl
 - HBr
 - HI
 - CH_3COOH
41. Which one of the following ionic hydroxides is a soluble base?
- $\text{Cu}(\text{OH})_2$
 - $\text{Fe}(\text{OH})_2$
 - $\text{Fe}(\text{OH})_3$
 - $\text{Sr}(\text{OH})_2$
 - $\text{Al}(\text{OH})_3$
42. Which of the following statements about strong soluble bases is false?
- They are all metal hydroxides.
 - They are classified as weak electrolytes.
 - They produce OH^- in aqueous solution.
 - Their solutions conduct electricity.
 - 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?
- RbOH
 - KSCN
 - BaCO_3
 - LiBr
 - Na_3PO_4
44. Which one of the following compounds is **incorrectly** identified as to type of compound?

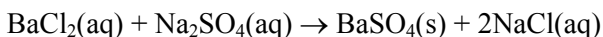
SubstanceType of Compound

- | | | | |
|--------------------|-------------|----------------------------|----------------|
| a. KOH | strong base | d. NH_3 | insoluble base |
| b. HClO_4 | strong acid | e. H_2SO_3 | weak acid |
| c. HNO_2 | weak acid | | |

45. Which one of the following salts is soluble in water?
- KClO_3
 - BaSO_4
 - Ag_3PO_4
 - CuS
 - FeCO_3
46. Which response includes all of the following salts that are **insoluble** in water, and no others?
- KI
 - AgBr
 - $(\text{NH}_4)_2\text{CO}_3$
 - $\text{Pb}(\text{CH}_3\text{COO})_2$
 - PbSO_4
- II, III, and IV
 - I
 - II and V
 - III, IV, and V
 - II and IV
47. Which response includes all of the following substances that are strong electrolytes, and no others?
- CH_3COOH
 - NH_4Cl
 - $\text{Cr}(\text{OH})_3$
 - KOH

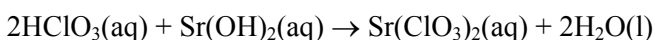
- a. I and II
b. II and III
c. II and IV
- d. I and IV
e. II, III, and I

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



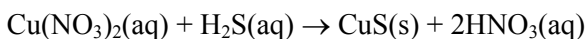
- a. $[\text{Ba}^{2+}(\text{aq}) + \text{Cl}^-(\text{aq})] + [\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})] \rightarrow \text{BaSO}_4(\text{s}) + [\text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})]$
b. $[\text{Ba}^{2+}(\text{aq}) + 2\text{Cl}^-(\text{aq})] + [2\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})] \rightarrow \text{BaSO}_4(\text{s}) + 2[\text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})]$
c. $[\text{Ba}^{2+}(\text{aq}) + 2\text{Cl}^-(\text{aq})] + 2[\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})] \rightarrow \text{BaSO}_4(\text{s}) + 2[\text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})]$
- d. $[\text{Ba}^{2+}(\text{aq}) + 2\text{Cl}^-(\text{aq})] + [\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})] \rightarrow \text{BaSO}_4(\text{s}) + [\text{Na}^+(\text{aq}) + \text{Cl}^-(\text{aq})]$
e. $\text{Ba}^{2+}(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) \rightarrow \text{BaSO}_4(\text{s})$

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



- 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?



- a. $\text{Cu}^{2+}(\text{aq}) + \text{H}_2\text{S}(\text{aq}) \rightarrow \text{CuS}(\text{s}) + 2\text{H}^+(\text{aq})$
b. $[\text{Cu}^{2+}(\text{aq}) + 2\text{NO}_3^-(\text{aq})] + \text{H}_2\text{S}(\text{aq}) \rightarrow \text{CuS}(\text{s}) + 2[\text{H}^+(\text{aq}) + 2\text{NO}_3^-(\text{aq})]$
c. $\text{Cu}^{2+}(\text{aq}) + 2\text{H}^+(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{CuS}(\text{s}) + 2\text{H}^+(\text{aq})$
- d. $\text{Cu}^{2+}(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{CuS}(\text{s})$
e. $\text{Cu}^{2+}(\text{aq}) + 2\text{NO}_3^-(\text{aq}) + 2\text{H}^+(\text{aq}) + \text{S}^{2-}(\text{aq}) \rightarrow \text{CuS}(\text{s}) + 2\text{H}^+(\text{aq}) + 2\text{NO}_3^-(\text{aq})$

51. Determine the oxidation number of the underlined element in $\text{Na}\underline{\text{Mn}}\text{O}_4$.

- a. +1
b. +6
c. +3
- d. +7
e. +5

52. Determine the oxidation number of the underlined element in $(\text{NH}_4)_2\underline{\text{C}}\text{O}_3$.

- a. +1
b. +2
c. +3
- d. +4
e. +6

53. Determine the oxidation number of the underlined element in $\text{H}_2\underline{\text{Cr}}\text{O}_4$.

- a. +1
b. +2
c. +3
- d. +4
e. +6

54. Determine the oxidation number of the underlined element in $\text{H}_2\underline{\text{P}}\text{O}_4^{3-}$.

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

55. What are the oxidation numbers (oxidation states) of the elements in $\text{K}_2\text{Cr}_2\text{O}_7$?

- a. $\text{K} = +1$, $\text{Cr} = +7$, $\text{O} = -2$
b. $\text{K} = +1$, $\text{Cr} = +12$, $\text{O} = -2$
c. $\text{K} = +1$, $\text{Cr} = +6$, $\text{O} = -2$
- d. $\text{K} = +1$, $\text{Cr} = +8$, $\text{O} = -2$
e. $\text{K} = +2$, $\text{Cr} = +6$, $\text{O} = -2$

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

<u>Formula</u>	<u>Name</u>
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?

<u>Formula</u>	<u>Name</u>
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?

<u>Formula</u>	<u>Name</u>
a. LiClO_2	lithium chlorite
b. HIO_3	periodic acid
c. HClO_2	chlorous acid
d. HBrO	hypobromous acid
e. $\text{Sr}(\text{ClO}_4)_2$	strontium perchlorate

59. What is the correct name for NH_4ClO_3 ?

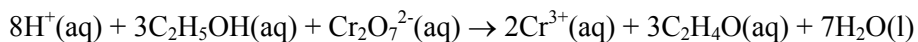
- | | |
|------------------------------|---------------------------|
| a. nitrogen chlorate | d. tetraammonium chlorite |
| b. tetraammonium trichloride | e. ammonium chlorate |
| c. ammonium chloride | |

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

- I. $\text{PCl}_3(\text{l}) + 3\text{H}_2\text{O}(\text{l}) \rightarrow 3\text{HCl}(\text{aq}) + \text{H}_3\text{PO}_3(\text{aq})$
 II. $\text{Fe}_2\text{O}_3(\text{s}) + 3\text{CO}(\text{g}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{CO}_2(\text{g})$
 III. $\text{CaCO}_3(\text{s}) + 2\text{HClO}_3(\text{aq}) \rightarrow \text{Ca}(\text{ClO}_3)_2(\text{aq}) + \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$

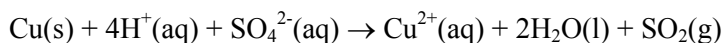
- | | |
|--------|---------------|
| a. I | d. II and III |
| b. II | e. I and II |
| c. III | |

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



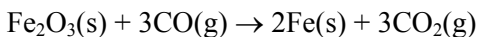
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|---------------------------------|------------------------------------|
| a. H^+ | d. $\text{C}_2\text{H}_5\text{OH}$ |
| b. $\text{Cr}_2\text{O}_7^{2-}$ | e. H_2O |
| c. Cr^{3+} | |

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



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

63. In the following reaction CO is _____.



- 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. $\text{AgNO}_3(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{HNO}_3(\text{aq})$
- b. $\text{Na}_2\text{O}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{Na}_2\text{CO}_3(\text{s})$
- c. $\text{C}_3\text{H}_8(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 3\text{CO}_2(\text{g}) + 4\text{H}_2\text{O}(\text{l})$
- d. $2\text{H}_2\text{O}(\text{l}) \rightarrow 2\text{H}_2(\text{g}) + \text{O}_2(\text{g})$
- e. $\text{KOH}(\text{aq}) + \text{HCl}(\text{aq}) \rightarrow \text{KCl}(\text{aq}) + \text{H}_2\text{O}(\text{l})$

65. Which of the following is both a combination reaction and a reduction-oxidation reaction?

- a. $\text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- b. $\text{Zn}(\text{s}) + \text{CuNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{s}) + \text{ZnNO}_3(\text{aq})$
- c. $\text{Ca}(\text{OH})_2(\text{aq}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
- d. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
- e. $\text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s})$

66. Which of the following reactions is a decomposition reaction?

- a. $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
- b. $\text{Fe}_2\text{O}_3(\text{s}) + 3\text{CO}(\text{g}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{CO}_2(\text{g})$
- c. $\text{C}_3\text{H}_8(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 3\text{CO}_2(\text{g}) + 4\text{H}_2\text{O}(\text{l})$
- d. $2\text{AgNO}_3(\text{aq}) + \text{Zn}(\text{s}) \rightarrow 2\text{Ag}(\text{s}) + \text{Zn}(\text{NO}_3)_2(\text{aq})$
- e. $2\text{KClO}_3(\text{s}) \rightarrow 2\text{KCl}(\text{s}) + 3\text{O}_2(\text{g})$

67. Which of the following is both a decomposition reaction and a reduction-oxidation reaction?

- a. $\text{H}_2\text{CO}_3(\text{aq}) \rightarrow \text{CO}_2(\text{g}) + \text{H}_2\text{O}(\text{l})$
- b. $\text{Zn}(\text{s}) + \text{CuNO}_3(\text{aq}) \rightarrow \text{Cu}(\text{s}) + \text{ZnNO}_3(\text{aq})$
- c. $\text{Ca}(\text{OH})_2(\text{aq}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
- d. $2\text{NH}_4\text{NO}_3(\text{s}) \rightarrow 2\text{N}_2(\text{g}) + \text{O}_2(\text{g}) + 4\text{H}_2\text{O}(\text{g})$
- e. $\text{CaCO}_3(\text{s}) \rightarrow \text{CaO}(\text{s}) + \text{CO}_2(\text{g})$

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

- I. $\text{P}_4\text{O}_{10}(\text{s}) + 6\text{Na}_2\text{O}(\text{s}) \rightarrow 4\text{Na}_3\text{PO}_4(\text{s})$
- II. $2\text{AgNO}_3(\text{aq}) + \text{Zn}(\text{s}) \rightarrow 2\text{Ag}(\text{s}) + \text{Zn}(\text{NO}_3)_2(\text{aq})$
- III. $\text{Ca}(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{CaCl}_2(\text{aq}) + \text{H}_2(\text{g})$
- IV. $\text{Fe}(\text{OH})_2(\text{s}) + 2\text{HCl}(\text{aq}) \rightarrow \text{FeCl}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$

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

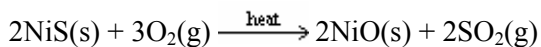
69. Which response includes all of the following that are displacement reactions, and no other reactions?

- I. $2\text{KBr}(\text{aq}) + \text{F}_2(\text{g}) \rightarrow 2\text{KF}(\text{aq}) + \text{Br}_2(\text{l})$
- II. $\text{N}_2\text{O}_3(\text{g}) \xrightarrow{\text{heat}} \text{NO}(\text{g}) + \text{NO}_2(\text{g})$
- III. $\text{PF}_3(\text{g}) + \text{F}_2(\text{g}) \rightarrow \text{PF}_5(\text{g})$
- IV. $2\text{Na}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \xrightarrow{\text{heat}} 2\text{NaOH}(\text{aq}) + \text{H}_2(\text{g})$

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

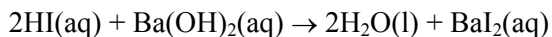
70. Which one of the following ions would be displaced from aqueous solution by magnesium?
- Ca^{2+}
 - Cu^{2+}
 - Li^+
 - K^+
 - Na^+
71. Which response includes all of the following reactions that **will occur** in aqueous solution, and no others?
- $2\text{NaF}(\text{aq}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NaCl}(\text{aq}) + \text{F}_2(\text{g})$
 - $2\text{NaCl}(\text{aq}) + \text{I}_2(\text{s}) \rightarrow 2\text{NaI}(\text{aq}) + \text{Cl}_2(\text{g})$
 - $2\text{NaBr}(\text{aq}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NaCl}(\text{aq}) + \text{Br}_2(\text{l})$
 - $2\text{NaI}(\text{aq}) + \text{Br}_2(\text{l}) \rightarrow 2\text{NaBr}(\text{aq}) + \text{I}_2(\text{s})$
 - $2\text{NaBr}(\text{aq}) + \text{I}_2(\text{s}) \rightarrow 2\text{NaI}(\text{aq}) + \text{Br}_2(\text{l})$
- I, II, and III
 - III and IV
 - II, IV, and V
 - I and III
 - 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?
- $2\text{H}^+(\text{aq}) + 2\text{e}^- \rightarrow \text{H}_2(\text{g})$
 - $2\text{H}^+(\text{aq}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 4\text{OH}^-(\text{aq})$
 - $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$
 - $\text{H}_2\text{O}(\text{l}) + \text{OH}^-(\text{aq}) \rightarrow \text{O}_2(\text{g}) + 3/2\text{H}_2(\text{g})$
 - $2\text{H}^+(\text{aq}) + \text{O}^{2-}(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l})$
73. Write the balanced **formula unit** equation for the complete reaction of barium hydroxide with perchloric acid. What is the coefficient of H_2O ?
- 1
 - 2
 - 3
 - 4
 - 5
74. Identify the **net ionic** equation for the reaction of HClO_2 and lithium hydroxide.
- $\text{HClO}_2(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{ClO}_2^-(\text{aq}) + \text{H}_2\text{O}(\text{l})$
 - $\text{HClO}_2(\text{aq}) + 2\text{OH}^-(\text{aq}) \rightarrow \text{ClO}_2^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
 - $2\text{HClO}_2(\text{aq}) + \text{Ba}(\text{OH})_2(\text{aq}) \rightarrow \text{Ba}(\text{ClO}_2)_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
 - $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$
 - $2\text{HClO}_2(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow 2\text{ClO}_2^-(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
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.
- No precipitate forms.
 - AgCl precipitates. $\text{Ag}^+(\text{aq}) + \text{Cl}^-(\text{aq}) \rightarrow \text{AgCl}(\text{s})$
 - Ag_3N precipitates. $6\text{Ag}^+(\text{aq}) + 2\text{NO}_3^-(\text{aq}) \rightarrow 2\text{Ag}_3\text{N}(\text{s}) + 3\text{O}_2(\text{g})$
 - AgCl precipitates. $\text{Ag}^+(\text{aq}) + \text{NaCl}(\text{aq}) \rightarrow \text{AgCl}(\text{s}) + \text{Na}^+(\text{aq})$
 - NaNO_3 precipitates. $\text{NO}_3^-(\text{aq}) + \text{Na}^+(\text{aq}) \rightarrow \text{NaNO}_3(\text{s})$
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.
- No precipitate forms.
 - NaNO_3 precipitates. $\text{Na}^+(\text{aq}) + \text{NO}_3^-(\text{aq}) \rightarrow \text{NaNO}_3(\text{s})$
 - NH_4BrO_3 precipitates. $\text{NH}_4^+(\text{aq}) + \text{NO}_3^-(\text{aq}) + \text{Br}^-(\text{aq}) \rightarrow \text{NH}_4\text{BrO}_3(\text{s}) + \text{N}_2$
 - NH_4N precipitates. $2\text{NH}_4^+(\text{aq}) + 2\text{NO}_3^-(\text{aq}) \rightarrow 2\text{NH}_4\text{N}(\text{s}) + 3\text{O}_2(\text{g})$
 - NH_4Br precipitates. $\text{NH}_4^+(\text{aq}) + \text{Br}^-(\text{aq}) \rightarrow \text{NH}_4\text{Br}(\text{s})$

- _____ 77. Classify the following reaction by giving the reaction type that applies.



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

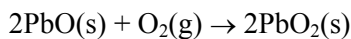
- _____ 78. Classify the following reaction by giving the reaction type that applies.



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

- _____ 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



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

- _____ 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



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

General Chemistry I Answer Section

Exam 2 Review

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