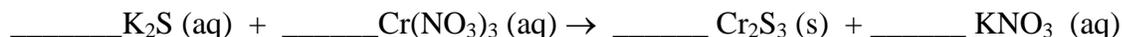


**MULTIPLE CHOICE AND FILL IN THE BLANK. Circle the one alternative that best completes the statement or answers the question or fill in the blank.**

1. Which of the following is insoluble in water? (2 pts.)

- A)  $\text{Li}_2\text{CO}_3$       B)  $\text{Pb}(\text{NO}_3)_2$       C)  $\text{Al}(\text{OH})_3$       D)  $\text{Ba}(\text{OH})_2$

2. Balance the following reaction. (3 pt.)



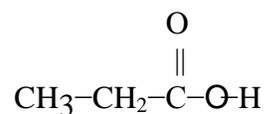
3. What is the oxidation charge of sulfur in  $\text{SO}_3^{-2}$ ? \_\_\_\_\_ (2 pts.)

4. Which element in the following reaction is reduced? (2 pts.)



- A) CaO      B) Ca      C)  $\text{O}_2$       D) None of these, this is not a Redox reaction.

5. Classify the following organic compound. (2 pts.)



- a) alkene      b) alkyne      c) alcohol      d) ether  
e) aldehyde      f) ketone      g) ester      h) amine  
i) carboxylic acid

**CALCULATIONS and STRUCTURES. Show answers with units and correct significant figures. MUST SHOW WORK!**

6. Write the chemical equation of the combustion reaction of  $\text{C}_2\text{H}_6$  (g) . You do not need to balance the equation. (2 pts.)

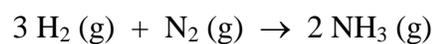
7. Calculate the molarity of a solution made by dissolving 15.0 g of  $\text{MgCl}_2$  in enough deionized water to make a total volume of 122.4 mL. (3 pts.)
8. What is the molar mass of  $\text{Ni}(\text{NO}_3)_2$ ? Give answer to 5 sig. figs. (3 pts.)
9. How many moles of  $\text{Ni}(\text{NO}_3)_2$  are in 37.0 g of  $\text{Ni}(\text{NO}_3)_2$ ? (2 pts.)
10. What is the percent composition by mass of nitrate ions in  $\text{Ni}(\text{NO}_3)_2$ ? Use 4 sig. figs. (3 pts.)

11. Find the molecular formula of a compound having the empirical formula of  $C_6H_7N$  and the molar mass of 186.24 g/mol. (3 pts.)

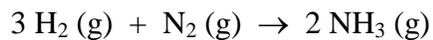
12. How many moles of chloride ions are in 120.00 mL of 0.144 M  $BaCl_2$ ? (3 pts.)

13. How many mL of 8.0 M NaOH are needed to prepare 200.00 mL of 3.00 M NaOH? (3 pts.)

14. How many moles of  $N_2$  react when 0.633 moles of hydrogen gas react? (2 pts.)



15. If we want to make 28.0 g of ammonia, how many moles of hydrogen gas do we need to react? (4 pts.)



16. Which of the following reactions will occur? Circle one answer. **If yes, write the products.** You do NOT need to balance the reaction. If you believe there is no reaction, do not write any products, or cross off any products. (2-3 pts. each)

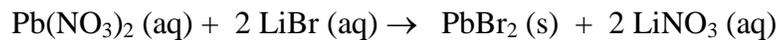
(a)  $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2 (\text{aq}) + \text{K}_2\text{CO}_3 (\text{aq}) \rightarrow$  yes or no  $\rightarrow$  \_\_\_\_\_

(b)  $(\text{NH}_4)_2\text{S} (\text{aq}) + \text{Na}_2\text{CO}_3 (\text{aq}) \rightarrow$  yes or no  $\rightarrow$  \_\_\_\_\_

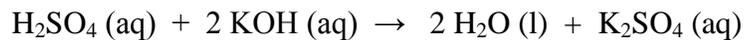
(c)  $\text{Ca}(\text{OH})_2 (\text{aq}) + \text{HNO}_3 (\text{aq}) \rightarrow$  yes or no  $\rightarrow$  \_\_\_\_\_

(d)  $\text{Li}_2\text{CO}_3 (\text{aq}) + \text{HCl} (\text{aq}) \rightarrow$  yes or no  $\rightarrow$  \_\_\_\_\_

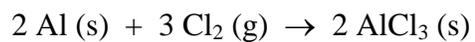
17. (a) Write the balanced Complete Ionic Equation for the following reaction. (4 pts.)  
(b) Write the balanced Net Ionic Equation for the following reaction. (3 pts.)



18. If 34.77 mL of 0.322 M KOH was required to completely neutralize 20.00 mL of  $\text{H}_2\text{SO}_4$ , what is the molarity of the  $\text{H}_2\text{SO}_4$ ? (6 pts.)

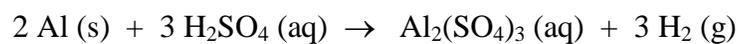


19. What is the percent yield in the following reaction if 128.7 g of  $\text{Cl}_2$  (g) react with excess aluminum and 135.8 g of aluminum chloride are produced? (5 pts.)



20. What is the empirical formula of ibuprofen (an aspirin substitute) which contains 75.69% C, 8.80% H, and 15.51% O by mass? (5 pts.)

21. (a) How many moles of aluminum sulfate are produced when 0.203 moles of aluminum react with 0.241 moles of  $\text{H}_2\text{SO}_4$ ? (b) How many moles of the excess reactant remain? MUST show work and explain. (7 pts.)



**NOMENCLATURE. Fill in the chemical formula or the chemical name, whichever is missing. (2 pts. each)**

Chemical Formula

Chemical Name

22.  $\text{SO}_3$

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23.  $\text{SO}_3^{-2}$

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24.  $\text{FeO}$

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25.  $\text{Ni}_2\text{SO}_4$

---

26.  $\text{Li}_3\text{PO}_4$

---

27.  $\text{HNO}_3$

---

28. titanium (II) hypochlorite

---

29. magnesium nitrite

---

30. lead (IV) sulfide

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31. chlorous acid

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