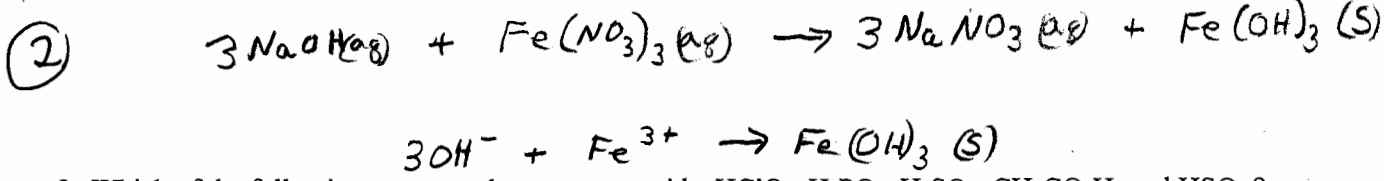
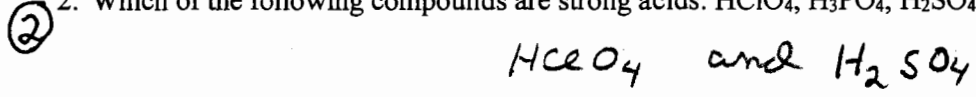


Show all work to receive credit.

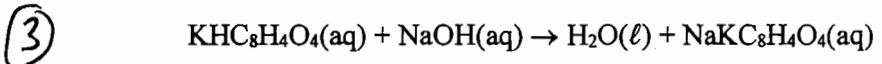
1. What is the net ionic equation for the reaction of sodium hydroxide with iron(III) nitrate?



2. Which of the following compounds are strong acids: HClO₄, H₃PO₄, H₂SO₄, CH₃CO₂H, and HSO₄⁻?



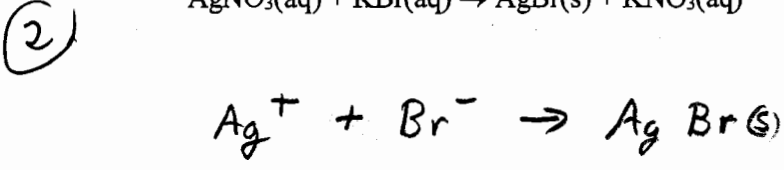
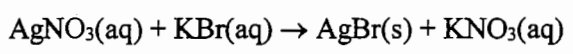
3. Potassium hydrogen phthalate (KHP) is a weak acid that is used to standardize sodium hydroxide according to the net ionic equation below.



If 2.02 g KHP (molar mass = 204.2 g/mol) is titrated with 28.34 mL of NaOH, what is the concentration of NaOH?

$$\frac{28.34 \times 10^{-3} \text{ L NaOH}}{2.02 \text{ g KHP}} \times \frac{1 \text{ mol KHP}}{204.2 \text{ g KHP}} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol KHP}} = 0.349 \frac{\text{mol NaOH}}{\text{L NaOH}}$$

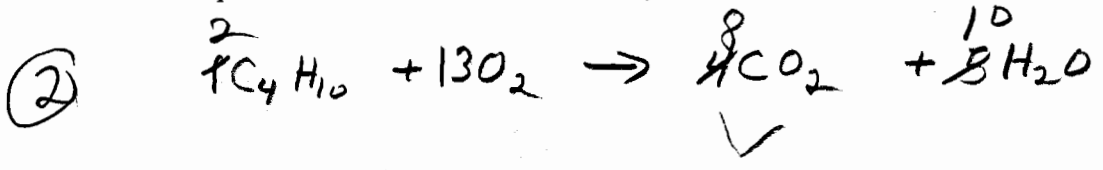
4. What is the net ionic equation for the reaction below?



5. How many liters of 0.1507 M NaOH contain 9.00 g of NaOH?

(3) $\frac{9.00 \text{ g NaOH}}{40.0 \text{ g NaOH}} \times \frac{1 \text{ mol NaOH}}{40.0 \text{ g NaOH}} \times \frac{1 \text{ L NaOH}}{0.1507 \text{ mol NaOH}} = 1.49 \text{ L NaOH}$

6. The products of the complete combustion of a hydrocarbon are carbon dioxide and water. Write a balanced chemical equation for the combustion of butane, C₄H₁₀.



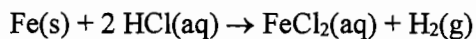
$8 + 5 = 13$

More Questions on Back.

Key

① 7. What is the oxidation number of manganese in KMnO_4 ? +7 $\frac{+1}{K} + \frac{x}{Mn} + \frac{4(-2)}{O} = 0$

8. Iron reacts with hydrochloric acid to produce iron (II) chloride and hydrogen gas.



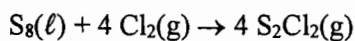
How many moles of HCl will react with 5.5 moles of Fe?

②
$$\frac{5.5 \text{ mol Fe} \mid 2 \text{ mol HCl}}{\mid 1 \text{ mol Fe}} = 11 \text{ moles}$$

9. If 1.928 g KNO_3 is dissolved in enough water to make 350.0 mL of solution, what is the molarity of potassium nitrate?

③
$$\frac{1.928 \text{ g KNO}_3 \mid \text{mol}}{\mid 101.11 \text{ g} \mid 0.3500 \text{ L}} = 0.05448 \frac{\text{mol}}{\text{L}}$$

10. Disulfur dichloride can be made by reacting chlorine gas with molten sulfur.



What is the percent yield if 4.88 g S_2Cl_2 is isolated from the reaction of 10.0 g S_8 and 6.00 g Cl_2 ?

⑤

Based on S_8 :

$$\frac{10 \text{ g S}_8 \mid \text{mol S}_8 \mid 4 \text{ mol S}_2\text{Cl}_2 \mid 135.04 \text{ g S}_2\text{Cl}_2}{\mid 256.56 \text{ g S}_8 \mid 1 \text{ mol S}_8 \mid \text{mol S}_2\text{Cl}_2} = 21.05 \text{ g S}_2\text{Cl}_2$$

Based on Cl_2 :

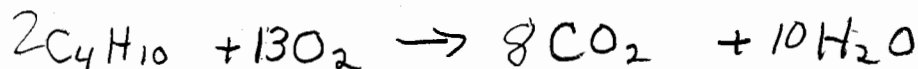
$$\frac{6.00 \text{ g Cl}_2 \mid \text{mol Cl}_2 \mid 4 \text{ mol S}_2\text{Cl}_2 \mid 135.04 \text{ g S}_2\text{Cl}_2}{\mid 70.9 \text{ g Cl}_2 \mid 4 \text{ mol Cl}_2 \mid \text{mol S}_2\text{Cl}_2} = 11.43 \text{ g S}_2\text{Cl}_2$$

$\frac{4.88}{11.43} \times 100 = 42.7\% \text{ yld}$

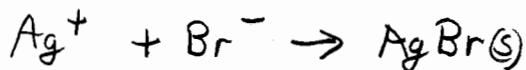
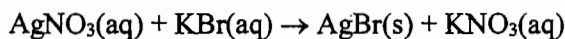
Key "yellow"

Show all work to receive credit.

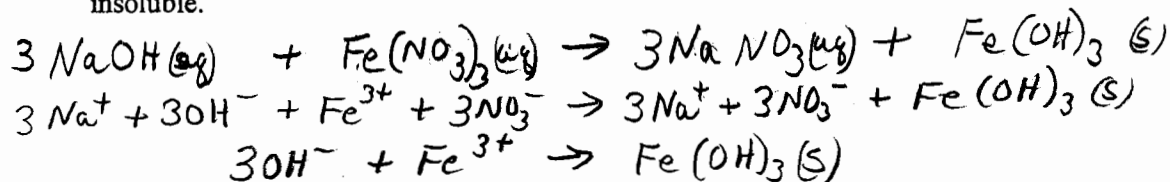
- ② 1. The products of the complete combustion of a hydrocarbon are carbon dioxide and water. Write a balanced chemical equation for the combustion of butane, C_4H_{10} .



- ② 2. What is the net ionic equation for the reaction below?



- ② 3. What is the net ionic equation for the reaction of sodium hydroxide with iron(III) nitrate? Iron(III) hydroxide is insoluble.



4. Which of the following compounds are strong acids: $HClO_4$, H_3PO_4 , H_2SO_4 , CH_3CO_2H , and HSO_4^- ?



- ② 5. What is the oxidation number of manganese in $KMnO_4$? +7

- ① 6. If 1.928 g KNO_3 is dissolved in enough water to make 250.0 mL of solution, what is the molarity of potassium nitrate?

$$\frac{1.928 \text{ g } KNO_3}{101.11 \text{ g } KNO_3} \times \frac{1 \text{ mol } KNO_3}{101.11 \text{ g } KNO_3} \div \frac{0.2500 \text{ L}}{1} = 0.0762 \frac{\text{mol } KNO_3}{L}$$

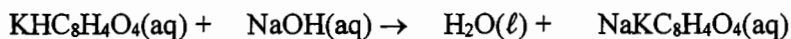
- ③ 7. How many liters of 0.1107 M NaOH contain 10.00 g of NaOH?

$$\frac{10.00 \text{ g NaOH}}{40.00 \text{ g}} \times \frac{1 \text{ mol}}{40.00 \text{ g}} \div \frac{0.1107 \text{ mol}}{L} = 2.258 \text{ L}$$

More questions on back of page.

Key A "yellow"

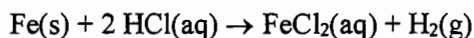
8. Potassium hydrogen phthalate (KHP) is a weak acid that is used to standardize sodium hydroxide according to the equation below.



- ③ If 1.02 g KHP (molar mass = 204.2 g/mol) is titrated with 28.34 mL of NaOH, what is the concentration of NaOH?

$$\frac{1.02 \text{ g KHP}}{204.2 \text{ g}} \times \frac{1 \text{ mol}}{1 \text{ mol KHP}} \times \frac{1 \text{ mol NaOH}}{1 \text{ mol KHP}} \times 28.34 \times 10^{-3} \text{ L} = 0.176 \frac{\text{mol NaOH}}{\text{L}}$$

9. Iron reacts with hydrochloric acid to produce iron (II) chloride and hydrogen gas.

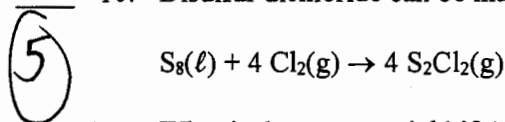


How many moles of HCl will react with 3.5 moles of Fe?

②

$$\frac{3.5 \text{ mol Fe}}{1 \text{ mol Fe}} \times \frac{2 \text{ mol HCl}}{1 \text{ mol Fe}} = 7.0 \text{ mol HCl}$$

10. Disulfur dichloride can be made by reacting chlorine gas with molten sulfur.



What is the percent yield if 4.88 g S_2Cl_2 is isolated from the reaction of 10.0 g S_8 and 6.00 g Cl_2 ?

Based on S_8 :

$$\frac{10.0 \text{ g S}_8}{256.56 \text{ g S}_8} \times \frac{1 \text{ mol S}_8}{1 \text{ mol S}_8} \times \frac{4 \text{ mol S}_2\text{Cl}_2}{1 \text{ mol S}_8} \times 135.04 \text{ g S}_2\text{Cl}_2 = 21.1 \text{ g S}_2\text{Cl}_2$$

Based on Cl_2 :

$$\frac{6.00 \text{ g Cl}_2}{70.9 \text{ g Cl}_2} \times \frac{1 \text{ mol Cl}_2}{1 \text{ mol Cl}_2} \times \frac{4 \text{ mol S}_2\text{Cl}_2}{4 \text{ mol Cl}_2} \times 135.04 \text{ g S}_2\text{Cl}_2 = 11.43 \text{ g S}_2\text{Cl}_2$$

$$\frac{4.88}{11.43} \times 100 = 42.7 \% \text{ yld}$$