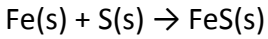
G11 Chemistry: Class 8 Homework

MULTIPLE CHOICE: Circle the correct answer. [5 marks]

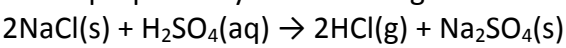
1. Calculate the mass of FeS formed when 9.42 g of iron reacts with 8.50 g of sulfur according to the following reaction.



$$Fe(s) + S(s) \rightarrow FeS(s)$$

A) 17.9 g
B) 87.9 g
C) 26.0 g
D) 14.8 g
E) 1.91×10^{-3} g

2. Hydrogen chloride gas can be prepared by the following reaction:

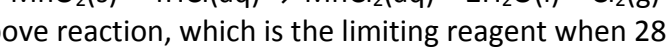


$$2NaCl(s) + H_2SO_4(aq) \rightarrow 2HCl(g) + Na_2SO_4(s)$$

How many grams of HCl can be prepared from 2.00 mol H_2SO_4 and 150 g NaCl?

A) 7.30 g
B) 93.5 g
C) 146 g
D) 150 g
E) 196 g

3. Chlorine gas can be made from the reaction of manganese dioxide with hydrochloric acid.

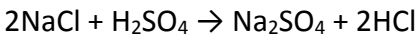


$$MnO_2(s) + 4HCl(aq) \rightarrow MnCl_2(aq) + 2H_2O(l) + Cl_2(g)$$

According to the above reaction, which is the limiting reagent when 28 g of MnO_2 are reacted with 42 g of HCl?

A) MnO_2
B) HCl
C) $MnCl_2$
D) Cl_2
E) No reagent is limiting.

4. When 22.0 g NaCl and 21.0 g H_2SO_4 are mixed and react according to the equation below, which is the limiting reagent?



$$2NaCl + H_2SO_4 \rightarrow Na_2SO_4 + 2HCl$$

A) NaCl
B) H_2SO_4
C) Na_2SO_4
D) HCl
E) No reagent is limiting.

5. What is the theoretical yield of chromium that can be produced by the reaction of 40.0 g of Cr_2O_3 with 8.00 g of aluminum according to the chemical equation below?

$$2Al + Cr_2O_3 \rightarrow Al_2O_3 + 2Cr$$

A) 7.7 g
B) 15.4 g
C) 27.3 g
D) 30.8 g
E) 49.9 g

SHORT ANSWER: Answer the following questions.

1. Given: $(NH_4)_2SO_4(s) + 2NaOH(aq) \rightarrow Na_2SO_4(aq) + 2NH_3(g) + 2H_2O(l)$
   What mass of NaOH is required to react completely with 15.4g of $(NH_4)_2SO_4$? **[5 marks]**

2. Given: $2Al(s) + Fe_2O_3(s) \rightarrow Al_2O_3(s) + 2Fe(l)$
   a. Calculate the mass of Al_2O_3 that is produced when 1.42×10^{24} atoms of Al react with Fe_2O_3. **[4 marks]**

   b. How many formula units of Fe_2O_3 are needed to react with 0.134g of Al? **[4 marks]**

3. Given: $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(s) + 3CO_2(g)$
   Calculate the mass of Fe if 11.5g of Fe_2O_3 reacts with 2.63×10^{24} molecules of CO.
   [7 marks]

4. Carbon disulfide is used as a solvent for water-insoluble compounds such as fats, oils, and waxes. Calculate the mass of carbon disulfide that is produced when 17.5g of carbon reacts with 225g of sulfur dioxide according to the following equation: **[7 marks]**

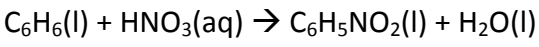
$$5C(s) + 2SO_2(g) \rightarrow CS_2(l) + 4CO(g)$$

5. The reaction of an aqueous solution of iron(III) sulfate with aqueous sodium hydroxide produces aqueous sodium sulfate and a solid precipitate, iron(III) hydroxide.

$$Fe_2(SO_4)_3(aq) + 6NaOH(aq) \rightarrow 3Na_2SO_4(aq) + 2Fe(OH)_3(s)$$

   What mass of $Fe(OH)_3$ is produced when 10.0g of $Fe_2(SO_4)_3$ reacts with an equal mass of NaOH? **[7 marks]**

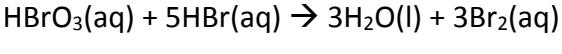
6. The following reaction proceeds with a 70% yield. **[6 marks]**



$$C_6H_6(l) + HNO_3(aq) \rightarrow C_6H_5NO_2(l) + H_2O(l)$$

Calculate the mass of $C_6H_5NO_2(l)$ expected if 12.8g of C_6H_6 reacts with excess HNO_3.

7. If 20.0g of $HBrO_3$ is reacted with excess HBr. **[7 marks]**



$$HBrO_3(aq) + 5HBr(aq) \rightarrow 3H_2O(l) + 3Br_2(aq)$$

a) What is the theoretical yield of Br_2 for this reaction?
b) If 47.3g of Br_2 is produced, what is the percentage yield of Br_2?