

Name :

Honors Chemistry

Section :

Mixed Stoichiometry Problems

1. How many pedals are needed to make 135 tricycles? The balanced equation for making a tricycle is: $F + S + 3W + H + 2P \rightarrow FSW_3HP_2$
2. Calculate the number of grams of H_2SO_4 produced when 27.0 g of H_2O react with 39.5 g SO_3 . The balanced equation is: $H_2O(g) + SO_3(g) \rightarrow H_2SO_4(g)$ How much excess reactant is left over?
3. What is the limiting reactant when 31.1 g SO_2 react with 27.7 g of O_2 according to the reaction:
 $2 SO_2 + O_2 \rightarrow 2SO_3$.

Calculate the maximum amount of product formed and the amount of unreacted excess reagent.

4. The fizz produced when an Alka-Seltzer tablet is dissolved in water is due to the reaction between sodium hydrogen carbonate, $NaHCO_3$, and citric acid, $H_3C_6H_5O_7$:
 $3 NaHCO_3(aq) + H_3C_6H_5O_7(aq) \rightarrow 3 CO_2(g) + 3 H_2O(l) + Na_3C_6H_5O_7(aq)$
In a certain experiment, 1.00g of sodium hydrogen carbonate and 1.00 g of citric acid are allowed to react.
 - a) Which reactant is the limiting reactant?
 - b) How many grams of CO_2 form?
 - c) How much of the excess reactant is left over?
5. One of the steps in the commercial process for converting ammonia to nitric acid involves the conversion of ammonia to NO: $4 NH_3(g) + 5 O_2(g) \rightarrow 4 NO(g) + 6 H_2O(g)$
In a certain experiment, 2.50 g NH_3 reacts with 2.85 g of O_2 .
 - a) Which is the limiting reagent?
 - b) How many grams of NO form?
 - c) How much excess reactant is left over?
6. Compute the heat change for the reaction of 1.24 g of NO according to the following equation.
 $2 NO + O_2 \rightarrow 2 NO_2 + 114.14 kJ$
7. Compute the heat change for the decomposition of 17.1 g of Fe_2O_3 according to the following equation. $2 Fe_2O_3 + 560.4 kJ \rightarrow 4 FeO + O_2$

Answers

1. 270 pedals
2. SO_3 is LR; 18.1 g H_2O remaining
3. SO_2 is LR; 38.9 g SO_3 theoretical yield; 19.9 g O_2 remaining
4. $NaHCO_3$ is LR; .611 g CO_2 ; .11 g citric acid remaining
5. O_2 is LR; 2.14 g NO formed; 1.29 g NH_3 remaining
6. -2.36 kJ (exothermic process)
7. +30.0 kJ (endothermic process)