

Stoichiometry Study Sheet Review

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Name _____

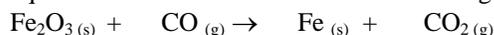
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1. Cobalt metal reacts with hydrochloric acid (write a balanced equation). If you begin with 2.56 g of cobalt metal and excess hydrochloric acid, what mass of cobalt II chloride can be obtained? What mass of hydrogen gas can be obtained?

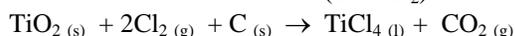
2. Nitrogen monoxide is oxidized in air to give brown nitrogen dioxide (write a balanced equation). Starting with 2.2 mol NO, how many moles and how many grams of O₂ are required for the complete reaction? What mass of NO₂, in grams is produced?

3. The equation for one of the reactions for reducing iron ore to the metal is (unbalanced):



- a) What is the maximum mass of iron, in grams, that can be produced from 454 g of Iron (III) oxide?
b) What mass of CO is required to reduce the Iron (III) oxide to iron metal?
4. If 225 g of SiCl₄ (l) are reacted with 225 g of Mg (s), to produce Si (s) and MgCl₂ (s), how much Si (s) can theoretically be produced? And, how much excess Mg will be left after the rxn?

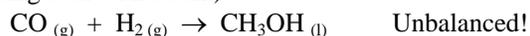
5. Starting with 125 g each of Cl₂ and C and plenty of TiO₂, which is the limiting reactant? What quantity, in grams, of TiCl₄ can be produced? And how much of the excess reactant (C or Cl₂) will remain unreacted?



6. Aluminum chloride, AlCl₃, is an inexpensive reagent used in many industrial processes. It is made by treating scrap aluminum with chlorine gas.

- a) Which reactant is limiting if 2.70 g of Al and 4.05 g of Cl₂ are mixed?
b) What mass of AlCl₃ can be produced?
c) What mass of excess reactant remains when the reaction is completed?

7. Methanol, CH₃OH, is a clean burning easily handled fuel. It can be made by the direct reaction of CO and H₂ (obtained from heating coal with steam).



Starting with a mixture of 12.0 g of H₂ and 74.5 g of CO, which is the limiting reactant? What mass of the excess reactant (in grams) remains after the reaction is complete? What is the theoretical yield of methanol?

8. What volume of hydrogen gas, H₂, measured at 27°C and 785 torr, can be obtained by reacting 5.60 g of Zn metal with 245 mL of 0.350 M HCl? The value for $R = 0.0821 \text{ L}\cdot\text{atm} / \text{mol}\cdot\text{K}$. What type of reaction is this? What is the oxidizing agent? What is being oxidized?