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| **Limiting Reagents and Percentage Yield Worksheet** | |
| **1.** | **Consider the reaction** |
|  | **I2O5(g) + 5 CO(g) ------->  5 CO2(g) + I2(g)** |
|  | 1. **80.0 grams of iodine(V) oxide, I2O5, reacts with 28.0 grams of carbon**   **monoxide, CO.**  **Determine the mass of iodine I2, which could be produced?** |
|  | **b)   If, in the above situation, only 0.160 moles, of iodine, I2 was produced.**  **i) what mass of iodine was produced?**  **ii) what percentage yield of iodine was produced.** |
| **2.** | **Zinc and sulphur react to form zinc sulphide according to the equation.** |
|  | **Zn   +    S   --------->    ZnS** |
|  | **If  25.0 g of zinc and 30.0 g of sulphur are mixed,**  **a)  Which chemical is the limiting reactant?**  **b)  How many grams of ZnS will be formed?**  **c)  How many grams of the excess reactant will remain after the reaction**  **is over?** |
| **3.** | **Which element is in excess when 3.00 grams of Mg is ignited in 2.20 grams**  **of pure oxygen?** **What mass is in excess? What mass of MgO is formed?** |
| **4.** | **How many grams of Al2S3 are formed when 5.00 grams of Al is heated**  **with 10.0 grams S?** |
| **5.** | **When MoO3 and Zn are heated together they react** |
|  | **3 Zn(s) + 2 MoO3(s) ----------> Mo2O3(s) + 3 ZnO(s)** |
|  | **What mass of ZnO is formed when 20.0 grams of MoO3 is reacted with**  **10.0 grams of Zn?** |
| **6.** | **Silver nitrate, AgNO3, reacts with iron(III) chloride, FeCl3, to give silver**  **chloride, AgCl, and iron(III) nitrate, Fe(NO3)3.  In a particular experiment,**  **it was plannned to mix 100mL of 1.48M AgNO3 with 75mL of 2.5M FeCl3.** |
|  | **a)  Write the chemical equation for the reaction.** |
|  | **b)  Which reactant is the limiting reactant?** |
|  | **c) What is the maximum number of moles of AgCl that could be obtained**  **from this mixture?** |
|  | **d)  What is the maximum number of grams of AgCl that could be obtained?** |
|  | **e)  How many grams of the reactant in excess will remain after the reaction**  **is over?** |
| **7.** | **Solid calcium carbonate, CaCO3, is able to remove sulphur dioxide from**  **waste gases by the reaction:** |
|  | **CaCO3  +  SO2  + other reactants ------>  CaSO3 + other products** |
|  | **In a particular experiment, 255 g of CaCO3 was exposed to 135 g of SO2 in the**  **presence of an excess amount of the other chemicals required for the reaction.** |
|  | **a)  What is the theoretical yield of CaSO3?** |
|  | **b)  If only 198 g of CaSO3 was isolated from the products, what was the precentage**  **yield of CaSO3 in this experiment?** |

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| **8.** | **A research supervisor told a chemist to make 100 g of chlorobenzene**  **from the reaction of benzene with chlorine and to expect a yield no**  **higher that 65%. The equation for the reaction is:** |
|  | **C6H6  +  Cl2     ----------->    C6H5Cl   +    HCl**  **benzene                                chlorobenzene**  **a) What is the minimum quantity of benzene that can give 100 g of**  **chlorobenzene if the yieldis 65%?**  **b) Calculate the mass of HCl produced.**  **c) Calculate the concentration of the HCl if the total volume of solution is**  **250mL.** |
| **9.** | **Certain salts of benzoic acid have been used as food additives for decades.**  **The potassium salt of benzoic acid, potassium benzoate, can be made by**  **the action of potassium permanganate on toluene.** |
|  | **C7H8  +  2 KMnO4  ------->  KC7H5O2  +  2 MnO2  +  KOH  + H2O**  **toluene                                      potassium**  **benzoate** |
|  | **If the yield of potassium benzoate cannot realistically be expected to be**  **more than 68%, what is the minimum number of grams of toluene needed**  **to achieve this yield while producing 10.0 g of KC7H5O2?** |
| **10.** | **Aluminum dissolves in an aqueous solution of NaOH according to the**  **following reaction:** |
|  | **2 NaOH  +  2 Al  +  2 H2O ----->  2 NaAlO2  +    3 H2** |
|  | **If 84.1 g of NaOH and 51.0 g of Al react:**  **i)  Which is the limiting reagent?**  **ii)   How much of the other reagent remains?**  **iii)   What mass of hydrogen is produced?** |