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Limiting and excess reactants pogil answer key

Take the reaction: NH3 + O2 NO + H2O. In an experiment, 3.25 g of NH3 are allowed to react with 3.50 g of O2. a. Which reactant is the limiting reagent? O2 b. How many grams of NO are formed? 2.63 g NO c. How much of the excess reactant remains after the reaction? 1.76 g NH3 left If 4.95 g of ethylene (C2H4) are combusted with 3.25 g of oxygen. a. What is the limiting reagent? O2 b. How many grams of CO2 are formed? 2.98 g CO2 Consider the reaction of C6H6 + Br2 C6H5Br + HBr a. What is the theoretical yield of C6H5Br if 42.1 g of C6H6 react with 73.0 g of Br2? 71.6 g C6H5Br b. If the actual yield of C6H5Br is 63.6 g, what is the percent yield? 88.8% Use the following reaction: C4H9OH + NaBr + H2SO4 C4H9Br + NaHSO4 + H2O If 15.0 g of C4H9OH react with 22.4 g of NaBr and 32.7 g of H2SO4 to yield 17.1 g of C4H9Br, what is the percent yield of this reaction? 61.6% Silicon nitride (Si3N4) is made by a combining Si and nitrogen gas (N2) at a high temperature. How much (in g) Si is needed to react with an excess of nitrogen gas to prepare 125 g of silicon nitride if the percent yield of the reaction is 95.0%? 79.1 g Si Souring of wine occurs when ethanol is converted to acetic acid by oxygen by the following reaction: C2H5OH + O2 CH3COOH + H2O. A 1.00 L bottle of wine, labeled as 8.5% (by volume) ethanol, is found to have a defective seal. Analysis of 1.00 mL showed that there were 0.0274 grams of acetic acid in that 1.00 mL. The density of ethanol is 0.816 g/mL and the density of water is 1.00 g/mL. a. What mass of oxygen must have leaked into the bottle?   14.6 g O2 b. What is the percent yield for the conversion of ethanol to acetic acid if O2 is in excess?   30.3% A reaction container holds 5.77 g of P4 and 5.77 g of O2.The following reaction occurs: P4 + O2 P4O6. If enough oxygen is available then the P4O6 reacts further: P4O6 + O2 P4O10. a. What is the limiting reagent for the formation of P4O10? O2 b. What mass of P4O10 is produced? 5.78 g P4O10 c. What mass of excess reactant is left in the reaction container? 5.76 g P4O6 remain Determine the limiting reagent and the amount of a product formed in a given reavion The limiting reagent is the reactant that is used up completely. This stops the reaction and no further products are made. Given the balanced chemical equation that describes the reaction, there are several ways to identify the limiting reagent. One way to determine the limiting reagent is to compare the mole ratios of the amounts of reactants used. This method is most useful when there are only two reactants. The limiting reagent can also be derived by comparing the amount of products that can be formed from each reactant. In a chemical reaction, the limiting reagent, or limiting reactant, is the substance that has been completely consumed when the chemical reaction is complete. The amount of product produced by the reaction is limited by this reactant because the reaction cannot proceed further without it; often, other reagents are present in excess of the quantities required to to react with the limiting reagent. From stoichiometry, the exact amount of reactant needed to react with another element can be calculated. However, if the reagents are not mixed or present in these correct stoichiometric proportions, the limiting reagent will be entirely consumed and the reaction will not go to stoichiometric completion. Limiting reagentThe limiting reagent in a reaction is the first to be completely used up and prevents any further reaction from occurring. In this reaction, reactant B is the limiting reagent because there is still some left over A in the products. Therefore, A was in excess when B was all used up. Determining the Limiting Reagent One way to determine the limiting reagent is to compare the mole ratio of the amount of reactants used. This method is most useful when there are only two reactants. One reactant (A) is chosen, and the balanced chemical equation is used to determine the amount of the other reactant (B) necessary to react with A. If the amount of B actually present exceeds the amount required, then B is in excess, and A is the limiting reagent. If the amount of B present is less than is required, then B is the limiting reagent. To begin, the chemical equation must first be balanced. The law of conservation states that the quantity of each element does not change over the course of a chemical reaction. Therefore, the chemical equation is balanced when the amount of each element is the same on both the left and right sides of the equation. Next, convert all given information (typically masses) into moles, and compare the mole ratios of the given information to those in the chemical equation. For example: What would be the limiting reagent if 75 grams of C2H3Br3 reacted with 50.0 grams of O2 in the following reaction: [latex]4 \ C_2H_3Br_3 + 11 \ O_2 \rightarrow 8 \ CO_2 + 6 \ H_2O + 6 \ Br_2[/latex] First, convert the values to moles: [latex]75 \ g \times \frac{1 \ mole}{266.72 \ g} = 0.28 \ mol \ C_2H_3Br_3[/latex] [latex]50.0 \ g \times \frac{1 \ mol}{32 \ g} = 1.56 \ mol \ O_2[/latex] It is then possible to calculate how much C2H3Br3 would be required if all the O2 is used up: [latex]1.56 \ mol \ O_2 \times \frac{4 \ mol \ C_2H_3Br_3}{11 \ mol \ O_2} = 0.567 \ mol \ C_2H_3Br_3[/latex] This demonstrates that 0.567 mol C2H3Br3 is required to react with all the oxygen. Since there is only 0.28 mol C2H3Br3 present, C2H3Br3 is the limiting reagent. Another method of determining the limiting reagent involves the comparison of product amounts that can be formed from each reactant. This method can be extended to any number of reactants more easily than the previous method. Again, begin by balancing the chemical equation and by converting all the given information into moles. Then use stoichiometry to calculate the mass of the product that could be produced for each individual reactant. The reactant that produces the least amount of product is the limiting reagent. For example: What would be the limiting reagent if 80.0 grams of Na2O2 reacted with 30.0 grams of H2O in the reaction? [latex]2 \ Na_2O_2 + 2 \ H_2O \rightarrow 4 \ NaOH + O_2[/latex] The comparison can be done with either product; for this example, NaOH will be the product compared. To determine how much NaOH is produced by each reagent, use the stoichiometric ratio given in the chemical equation as a conversion factor: [latex]\frac{4 \ mol \ NaOH}{2 \ mol \ Na_2O_2}[/latex] and [latex]\frac {4 \ mol \ NaOH}{2 \ mol \ H_2O}[/latex] Then convert the grams of each reactant into moles of NaOH to see how much NaOH each could produce if the other reactant was in excess. [latex]80.0 \ g \ Na_2O_2 \times \frac {1 \ mol \ Na_2O_2}{77.98 \ g \ Na_2O_2} \times \frac {4 \ moles \ NaOH}{2 \ mol \ Na_2O_2} = 2.06 \ moles \ NaOH[/latex] [latex]30.0 \ g \ H_2O \times \frac {1 \ mol \ H_2O}{18 \ g \ H_2O} \times \frac {4 \ moles \ NaOH}{2 \ moles \ H_2O} = 3.33 \ moles \ NaOH [/latex] Obviously the Na2O2 produces less NaOH than H2O; therefore, Na2O2 is the limiting reagent. STOICHIOMETRY – Limiting Reactant & Excess Reactant Stoichiometry & Moles – YouTubeA video showing two examples of how to solve limiting reactant stoichiometry problems. This video also explains how to determine the excess reactant too. ["388"]24_Limiting_and_Excess_Reactants-S - Limiting and Excess Reactants ... | limiting and excess reactants pogil answersImage Source: limiting and excess reactants pogil answers["1105.8"]Quiz | limiting and excess reactants pogil answersImage Source: ["1241.6"]Limiting and Excess Reactants - YouTube | limiting and excess reactants pogil answersImage Source: ["388"]Limiting Reactants - Limiting Excess Reactants with Stoichiometry ... | limiting and excess reactants pogil answersImage Source: ["388"]6 A student says I can see that we have three car bodies in ... | limiting and excess reactants pogil answersImage Source: ["485"]PERCENT YIELD AND LIMITING REACTANT WORKSHEET WITH ANSWERS by ... | limiting and excess reactants pogil answersImage Source: ["388"]Mr. Brueckner's AP Chemistry Blog 2016_17 | limiting and excess reactants pogil answersImage Source: ["388"]24_Limiting_and_Excess_Reactants-S - Limiting and Excess Reactants ... | limiting and excess reactants pogil answersImage Source: ["388"]24_Limiting_and_Excess_Reactants-S - Limiting and Excess Reactants ... | limiting and excess reactants pogil answersImage Source: ["388"]Limiting Reactants - Limiting Excess Reactants with Stoichiometry ... | limiting and excess reactants pogil answersImage Source: ["388"]6 A student says I can see that we have three car bodies in ... | limiting and excess reactants pogil answersImage Source: Limiting and Excess Reactants Bundleby This bundle contains the PowerPoint, worksheet, and accompanying key for Limiting and Excess Reactants. This is the fourth bundle in the scale factor method series. The worksheet can be used with any stoichiometry method, but the answer key shows how to answer the questions using the scale factor apPage 2

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