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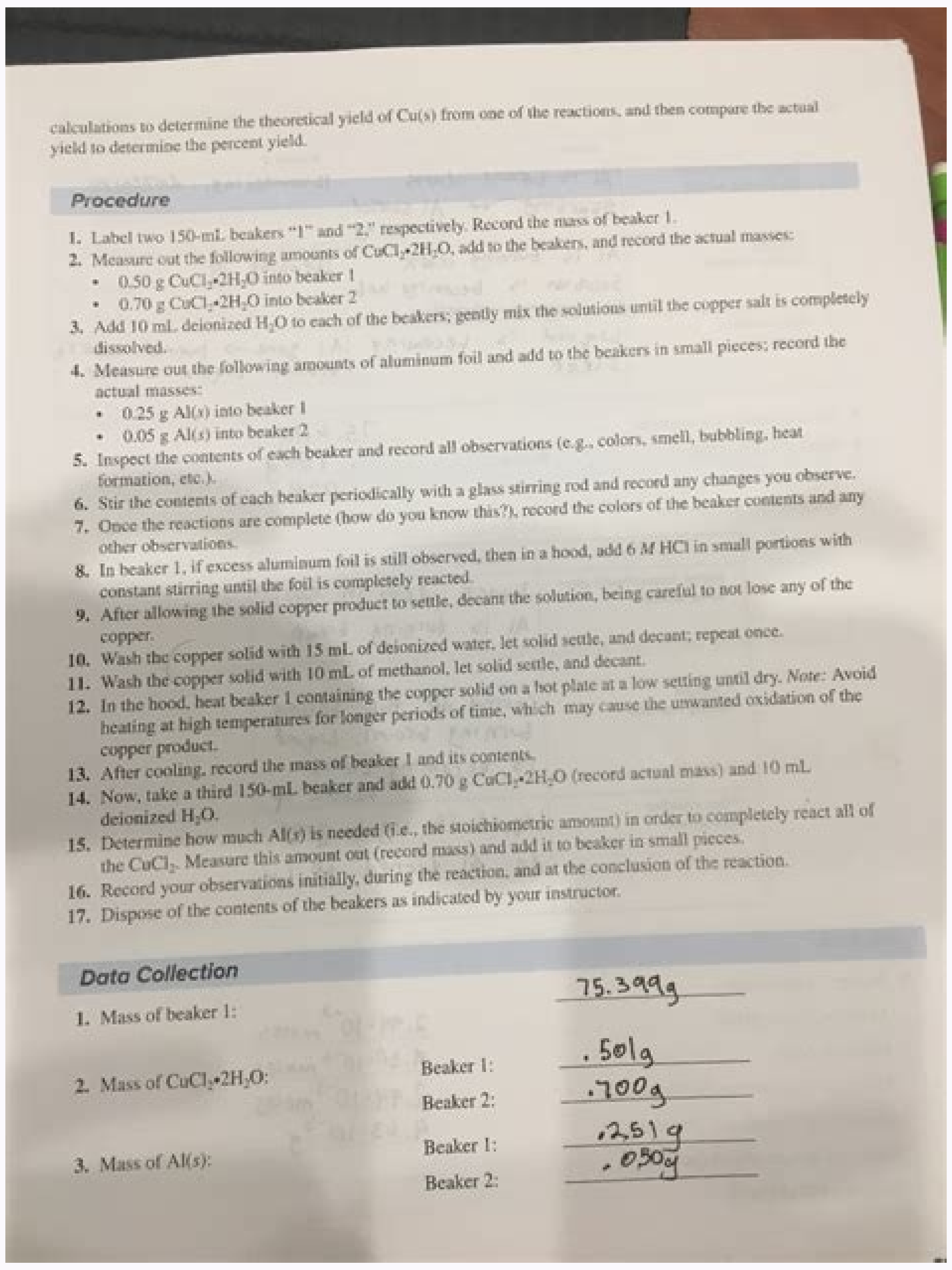
Observing a limiting reactant lab answers



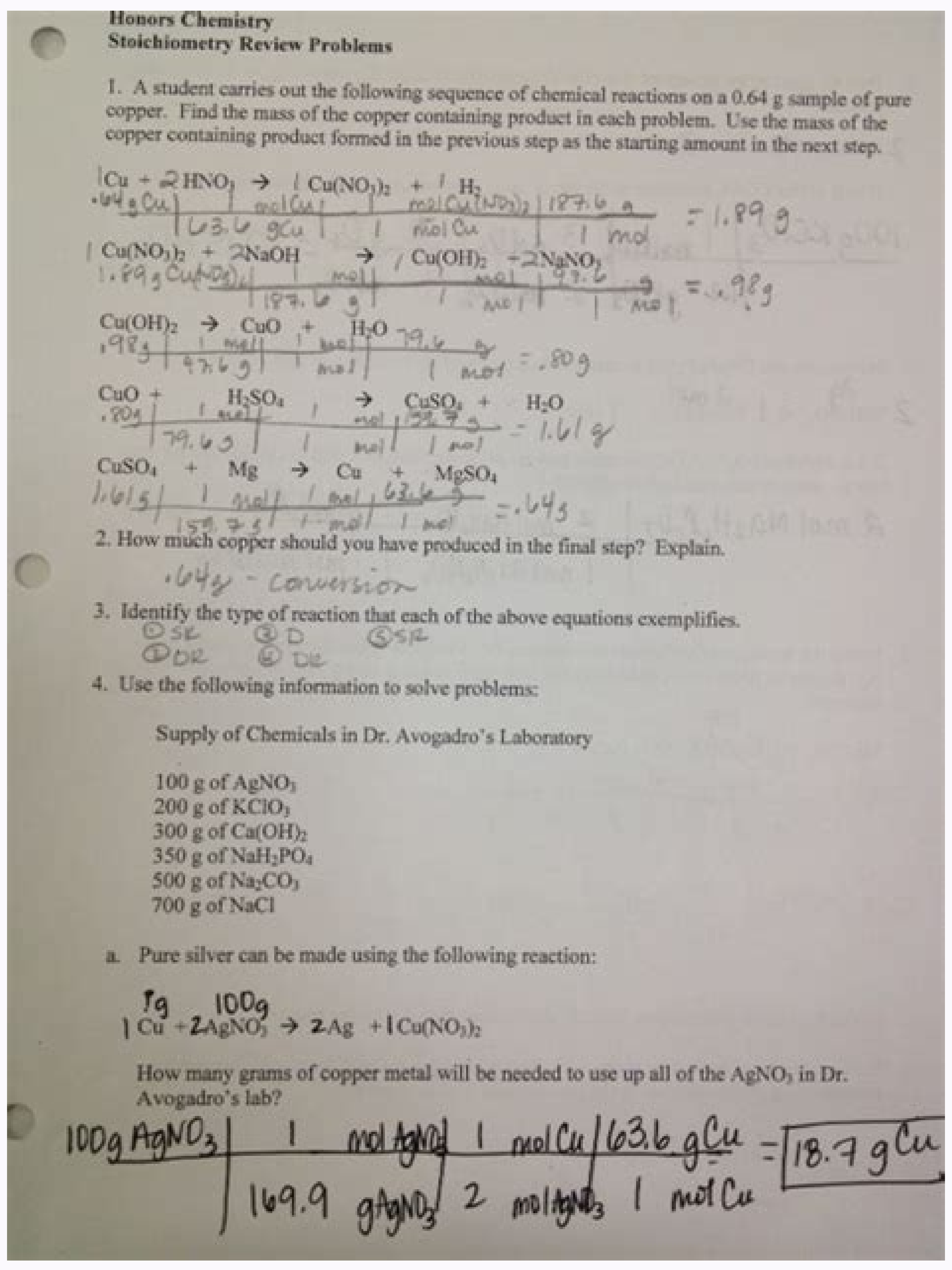
calculations to determine the theoretical yield of Cu(s) from one of the reactions, and then compare the actual yield to determine the percent yield.

Procedure

1. Label two 150-mL beakers "1" and "2," respectively. Record the mass of beaker 1.
2. Measure out the following amounts of $CuCl_2{\bullet}2H_2O$, add to the beakers, and record the actual masses:
   - 0.50 g $CuCl_2{\bullet}2H_2O$ into beaker 1
   - 0.70 g $CuCl_2{\bullet}2H_2O$ into beaker 2
3. Add 10 mL deionized H_2O to each of the beakers; gently mix the solutions until the copper salt is completely dissolved.
4. Measure out the following amounts of aluminum foil and add to the beakers in small pieces; record the actual masses:
   - 0.25 g Al(s) into beaker 1
   - 0.05 g Al(s) into beaker 2
5. Inspect the contents of each beaker and record all observations (e.g., colors, smell, bubbling, heat formation, etc.).
6. Stir the contents of each beaker periodically with a glass stirring rod and record any changes you observe.
7. Once the reactions are complete (how do you know this?), record the colors of the beaker contents and any other observations.
8. In beaker 1, if excess aluminum foil is still observed, then in a hood, add 6 *M* HCl in small portions with constant stirring until the foil is completely reacted.
9. After allowing the solid copper product to settle, decant the solution, being careful to not lose any of the copper.
10. Wash the copper solid with 15 mL of deionized water, let solid settle, and decant; repeat once.
11. Wash the copper solid with 10 mL of methanol, let solid settle, and decant.
12. In the hood, heat beaker 1 containing the copper solid on a hot plate at a low setting until dry. *Note:* Avoid heating at high temperatures for longer periods of time, which may cause the unwanted oxidation of the copper product.
13. After cooling, record the mass of beaker 1 and its contents.
14. Now, take a third 150-mL beaker and add 0.70 g $CuCl_2{\bullet}2H_2O$ (record actual mass) and 10 mL deionized H_2O.
15. Determine how much Al(*s*) is needed (i.e., the stoichiometric amount) in order to completely react all of the $CuCl_2$. Measure this amount out (record mass) and add it to beaker in small pieces.
16. Record your observations initially, during the reaction, and at the conclusion of the reaction.
17. Dispose of the contents of the beakers as indicated by your instructor.

Data Collection

1. Mass of beaker 1: 75.399g
2. Mass of $CuCl_2{\bullet}2H_2O$: Beaker 1: .501g Beaker 2: .700g
3. Mass of Al(*s*): Beaker 1: .251g Beaker 2: .050g



Honors Chemistry
Stoichiometry Review Problems

1. A student carries out the following sequence of chemical reactions on a 0.64 g sample of pure copper. Find the mass of the copper containing product in each problem. Use the mass of the copper containing product formed in the previous step as the starting amount in the next step.

1 Cu + 2 HNO_3 → 1 $Cu(NO_3)_2$ + 1 H_2
.64 g Cu | 1 mol Cu / 63.6 g Cu | 1 mol $Cu(NO_3)_2$ / 1 mol Cu | 187.6 g / 1 mol = 1.89 g

1 $Cu(NO_3)_2$ + 2 NaOH → 1 $Cu(OH)_2$ + 2 $NaNO_3$
1.89 g $Cu(NO_3)_2$ | 1 mol / 187.6 g | 1 mol / 1 mol | 97.6 g / 1 mol = .98 g

$Cu(OH)_2$ → CuO + H_2O
.98 g | 1 mol / 97.6 g | 1 mol / 1 mol | 79.6 g / 1 mol = .80 g

CuO + H_2SO_4 → $CuSO_4$ + H_2O
.80 g | 1 mol / 79.6 g | 1 mol / 1 mol | 159.7 g / 1 mol = 1.61 g

$CuSO_4$ + Mg → Cu + $MgSO_4$
1.61 g | 1 mol / 159.7 g | 1 mol / 1 mol | 63.6 g / 1 mol = .64 g

2. How much copper should you have produced in the final step? Explain.
.64 g - conversion

3. Identify the type of reaction that each of the above equations exemplifies.
① SR ② DR ③ D ④ DR ⑤ SR

4. Use the following information to solve problems:

Supply of Chemicals in Dr. Avogadro's Laboratory

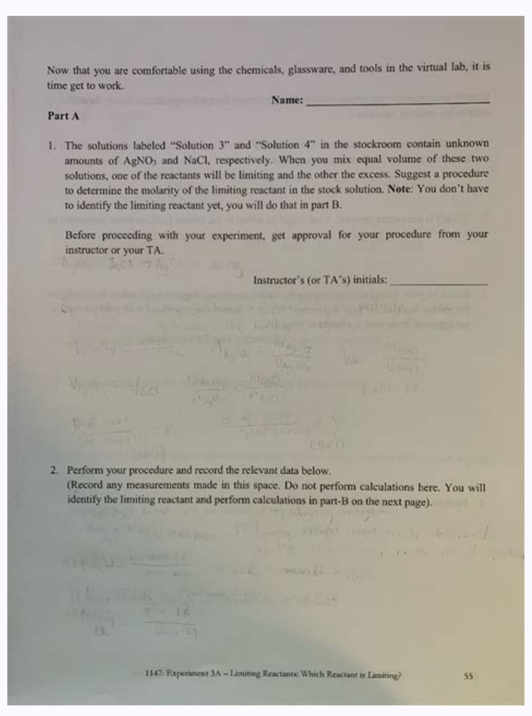
100 g of $AgNO_3$
200 g of $KClO_3$
300 g of $Ca(OH)_2$
350 g of NaH_2PO_4
500 g of Na_2CO_3
700 g of NaCl

a. Pure silver can be made using the following reaction:

?g 100g
1 Cu + 2 $AgNO_3$ → 2 Ag + 1 $Cu(NO_3)_2$

How many grams of copper metal will be needed to use up all of the $AgNO_3$ in Dr. Avogadro's lab?

100g $AgNO_3$ | 1 mol $AgNO_3$ / 169.9 g $AgNO_3$ | 1 mol Cu / 2 mol $AgNO_3$ | 63.6 g Cu / 1 mol Cu = 18.7 g Cu



Now that you are comfortable using the chemicals, glassware, and tools in the virtual lab, it is time get to work.

Name: ____________________

Part A

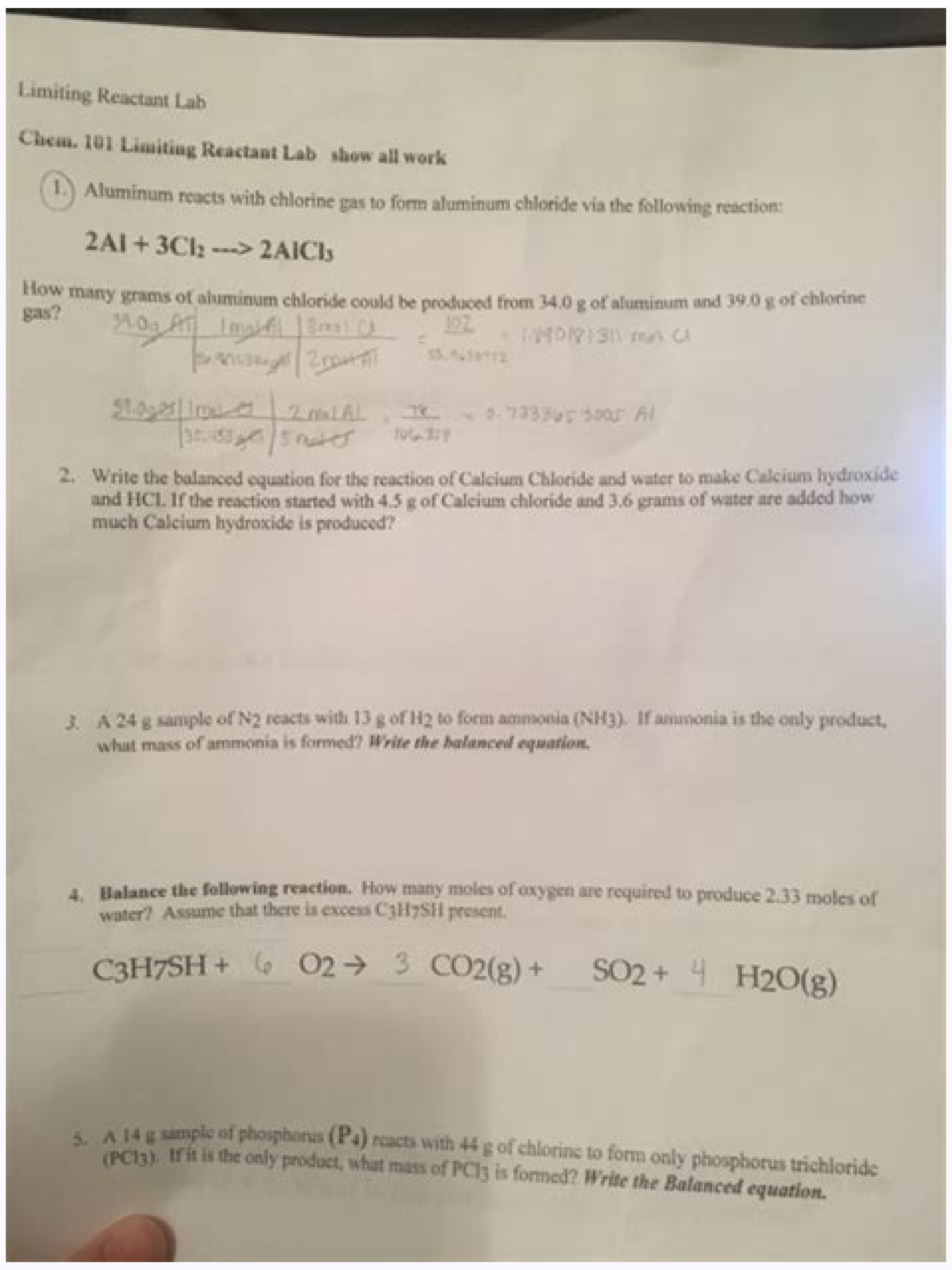
1. The solutions labeled "Solution 3" and "Solution 4" in the stockroom contain unknown amounts of $AgNO_3$ and NaCl, respectively. When you mix equal volume of these two solutions, one of the reactants will be limiting and the other the excess. Suggest a procedure to determine the molarity of the limiting reactant in the stock solution. **Note**: You don't have to identify the limiting reactant yet, you will do that in part B.

   Before proceeding with your experiment, get approval for your procedure from your instructor or your TA.

   Instructor's (or TA's) initials: ____________

2. Perform your procedure and record the relevant data below. (Record any measurements made in this space. Do not perform calculations here. You will identify the limiting reactant and perform calculations in part-B on the next page).

1147: Experiment 3A – Limiting Reactants: Which Reactant is Limiting? 55


Limiting Reactant Lab

Chem. 101 Limiting Reactant Lab show all work

1. Aluminum reacts with chlorine gas to form aluminum chloride via the following reaction:

$2Al + 3Cl_2 \text{--->} 2AlCl_3$

How many grams of aluminum chloride could be produced from 34.0 g of aluminum and 39.0 g of chlorine gas?

2. Write the balanced equation for the reaction of Calcium Chloride and water to make Calcium hydroxide and HCL If the reaction started with 4.5 g of Calcium chloride and 3.6 grams of water are added how much Calcium hydroxide is produced?

3. A 24 g sample of N_2 reacts with 13 g of H_2 to form ammonia (NH_3). If ammonia is the only product, what mass of ammonia is formed? ***Write the balanced equation.***

4. **Balance the following reaction.** How many moles of oxygen are required to produce 2.33 moles of water? Assume that there is excess C_3H_7SH present.

C_3H_7SH + 6 O_2 → 3 $CO_2(g)$ + ___ SO_2 + 4 $H_2O(g)$

5. A 14 g sample of phosphorus (P_4) reacts with 44 g of chlorine to form only phosphorus trichloride (PCl_3). If it is the only product, what mass of PCl_3 is formed? ***Write the Balanced equation.***

How do you identify a limiting reactant. What does a limiting reactant do. What is a limiting reactant example.

Then the filter paper opens in such a way that half has three thickness of filter paper and the other half has one (Figure 3). You must turn Mol. Describe the characteristics of the lib, called filtering. There is not enough holiday to make so many syphiches. The reagent that remains after the reaction is completed is called excess reagent. Describe the appearance of each solution. Describe the appearance of each of its filtered. Assuming that the reaction implies the union of dissolved ions, what are the possible identities of the symptoms formed in the mixture? You need two slices of bread and a piece of ham to make each syndwich. It must collect 10-20 ml of each filtering, clean of any precipitate. In laboratory experiments it is difficult to measure the chemical products in the exact relationship necessary for the chemical reaction. Once the ham is exhausted, it is not possible to make more sondwiches. Then you can subtract the amount of excessive reagent used in the chemical equation of the quantity with which it began. Answer all the questions in your laboratory notebook as this experiment completes. Ã ,ã ¢ {3} \): Open the filter paper ã ¢ Dumpster. Learning objectives to use observations to determine the correct reaction and the stoichiometry. Decant as much solution as possible before pouring the symptoms into the funnel. We could even take this a more step there and determine the amount of excessive reagent that remains at the end of the reaction. Spills, cages' errors, not drying a product and many other errors affect the mass of the obtained. Use Mole-Mole-Masa To calculate what reactive it will be limiting. Separate the mixture by severity filtration. Here the amount of product really produced in the laboratory experiment is compared to the amount of product that should have been carried out theoretically. What are the possible identities of the ions in the solution? While waiting, calculate the mass of CO (NO3) 2 added to each beaker and record these amounts in the table in your notebook. Summarize the results of these tests in your notebook. Calculate the percentage of reaction yield. Clean and rinse with distilled water four vessels of 100 ml and etheros 1-4. Sí³lids sometimes occur when a chemical reaction takes place. If you started with 28 g of N2 and 2.8 g of H2. Here theoretical performance is 0.93 mol NH3. Percentage of performance It is often important to calculate the percentage of performance of a reaction. Convert from the mol of the reagent to the mol of the product using the coefficients in the balanced equation (mol a mol). Copper is the oldest metal of humanity, which dates back to more than 10,000 years. The percentage of yield is given by equation: [latex] \ displaystyle \ text {percentage of performance} = \ fraud {\ text {real (experimental) performance}} {\ text {temonic performance}} \ Times100 \\ [/Latex] Guidelines to limit reagent problems (calculate theoretical performance): converts the grams of reagent added to the mole using molar dough. Using the appropriate graduate cylinder, record exactly the volumes of each solution that added to its table. How many complete syphiches could you do if you had eighteen slices of bread and six slices of ham? The limiting problems of the reagent (also called limiting reagent) use stoichiometry to determine the theoretical performance of a chemical reaction. Since the ham limits the amount of syphiches that we can The ham is our limiting reagent and the bread goes excess when the ham is consumed by the reaction. We establish this as a chemical equation where ham and bread are our reactive reagents Síndwich is our product:? Ã ¢ ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ ã ¢ Ã ¢ ã ¢ ã ¢ Ã ¢ ¢ ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ ã ¢ Ã ¢ ã ¢ ã ¢ Ã ¢ ¢ ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ Ã ¢ ã ¢ ã ¢ Ã ¢ ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ ã ¢ ¢ ã ¢ ã ¢ ã ¢ ã ¢ ã ¢ Ã ¢ ã ¢ ã ¢ Ã ¢ ¢ Ã ¢ isto isto isto of bread of bread â € + ã ¢ isto ã ¢ ã ¢ ¢ 1 piece of jam of syphiches we could do if we use all our reagents. Decant and filter each mixture of reaction of part II through a separate funnel, collecting its filtering in a precipitated vessel labeled. Ã ostile suggestions: These problems should be solved stoquiomã © trically. At the conference, he has learned to read chemical equations and evaluate the Mol / mol relations of reagents and products involved in a chemical reaction. (Save the mixture and two solutions for subsequent use). Describe the appearance of the mixture. Calculate theoretical performance. In an engraving bathroom, Cucl2 is used to eliminate unwanted copper of wiring tables with printed copper coating, leaving only copper "wiring. Cdot2 \ text {h} _ {2} \ text {o} [/latex] ã ¢ should be included in the cup of the molar mass. This is due to the ion Cu 2+. Below will find two different ways of using in the laboratory. What are dissolved in each solution? Describe the results. In the reaction between hydrógen and nitrógen, there are more than moisturized hydrone They indicate in bold. Convert from the mol of the product to the mol of the reactant using the molar dough. If we use the entire ham, we can only make 6 sinwiches. Example 2 for example, given the balanced reaction [lã¡tex] \ text {n } _ Arian to the filter paper to keep it in your (Figure 4). Add different Stock N3PO4 songs each vase of precipitates. Sin embargo, should be careful that it occurs with every past in the Camino. Given that in the posable determining what is reactive reactive limiting simply of Las Masas Masas Reagents must first turn grams into moles using molecular weights. The limiting reagent is completely consumed, while excess reagent (PAN) remains. If everything goes according to the plan, it will obtain exactly 100 percent of the theoretical performance produced in its reaction. Dissolve a small amount of cobalt nitrate (II), CO (NO3) 2, in approximately 20 ml of distilled water. Record the concentrations of the CO (NO3) 2 and NA3PO4 solutions in your notebook. Try a part with a stock solution CO (NO3) 2 and the other with a dropper full of stock na3po4 solution. We call these sysa a precipitate. There are some questions integrated in the procedure that must answer before continuing with the next step. For reasons of time and speed, the reaction mixtures in the laboratory will generally have a limiting reagent and an excess of reagent. This process has also been used for engraving bathroom regeneration. To carry out that cup, use theoretical performance to calculate the amount of excess reagent used in the reaction. Once the sycped has settled, the lyson or supernatant, carefully spills from a beaker, leaving the symptoms. Discuss your ideas with your laboratory instructor before continuing. When opting, the precipitate has time to settle at the bottom of the container. It doesn't matter if there is enough bread to make 9 sinwiches. Keep in mind that there must be a container placed below the funnel's vs. to catch water and filtered solution, or filtered. Dissolve a similar amount of sodium phosphate, Na3PO4, in a second 20 ml of water. Mol of one reagent cannot compare with another unless he considers the mol relationship. Mix each solution thoroughly and allow it to remain for at least 5 minutes. Pour half of each solution in a third glass of And mix well. Rinse several times to collect as many sysses as possible (Figure 5). The reaction is complete at this point. You cannot compare masses of In this experiment, it will predict and observe a limiting reagent during the reaction that implies the reduction of copper chloride dihydrate (II). If n2 is completely used 1 mol of n2 [latex] \ displaystyle \ fraid Area \ underline {0.93 \ text {mol nh} _ {3}} \\ [/latex] produced asã, since h2 will produce less of the product, it is the limiting reagent and n2 is the excessive reagent. It could monitor the progress progress by evaluating the color change that occurs in its beaker. The suggested amounts are: 5.0, 10.0, 15.0 and 20.0 ml. There are several ways to separate a symptoms from a solution. Keep in mind that for today's laboratory problems we will convert the mol of the product into grams using its molar mass. During gravity filtration, the filter paper is folded to adjust in a long vitago funnel bending the filter paper in half and then in the room (Figure 1 and 2). Divide the filtering in half and try each half with the remaining solutions of CO (NO3) 2 and Na3PO4. Write a balanced chemical equation based on these results. It will use the unique aluminum displacement reaction with aqueous copper chloride (II). Divide each of the filtered into two parts. Configure four filter funnels with filter papers and collection vessels labeled. The molar mass of hydrates should include the mass of the water cullets linked to the icing compound. When a precipitate is present in a solution, we will use one of the two types of filtration in our laboratory, gravity and leakers of succinial. Aluminum chloride is colorless in aqueous solution. The limiting reagent also determines the amount of that can do (theoretical performance). In addition, given that theoretical performance depends on the limiting reagent, we can say that our theoretical performance for The previous reaction is 6 syphiches. Once the sine is transferred to the funnel, use a washing bottle to rinse the remaining symore from the original container to the funnel. Be sure to answer them all as it progresses. If the filtering is cloudy, refilue its solution. According to their results in part 6, identify the ions in the solution and identity of the formed sys. The filter paper should be removed in the sysal waste container. This experiment has more experimental details than previous experiments. This will increase the speed of filtration. However, laboratory errors will often affect this number. Learning objectives Use stoichiometry to determine the limiting reagent. Therefore, [latex] \ displaystyle28 \ text {g n} _2 = \ fraud {1 \ text {mol n} _2} {28.0 \ text {g n} _2} = 1 \ text {mol n} _2 \\ [/ //// olatex] and [latex] \ dispaystyle2.8 \ text {g h} _2 = \ fraud } _2 \ 2 \ 2 \ 2 over It must convert the product of the product using the mol relationship. [latex] 2 \ text {al (s)}+3 \ text {cucl} _ {2} \ cdot2 \ text {h} _ {2} \ text {o} (aq) \ rearrow3 \ text {cu (s)} +2 \ text {alcl} _ {3} (aq) +6 \ text {h} _ {2} \ text {o (l)} [/latex] copper (ii) chloride, squat, turn a light a light Blue in aqueous solution. However, once Mol a mol is considered, it becomes evident that the hydrógen is the limiting reagent even though it was more mol. These must be answered in their laboratory notebook, since they will help it with your discussion later. Sixlid copper production is relevant in many industrial processes. Calculate the na3po4 mass added to each beaker and record this in your notebook. The reduction reaction of copper chloride (II) It has used in the Petróleo to sweeten industries (a refining process used to eliminate sulphurous natural gas gases). Determine the limiting reactant for different mixtures of the reagents. The limiting limiting reagent Be completely consumed in the reaction and limits the amount of product you can do. [latex] \ dispaystyle18 \ text {slices of bread} \ fraid I Example 1 Consider the process that is needed to make a ham syndwich. Sandwich.

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