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| **Reaction of Aluminum with a Strong Acid** | Name: |  |
| Hand-In, Chem 150L, Fall 2015 | Partner: |  |

See the attached rubric for more detailed information about grading.

1. (3 points) **Based on your observations for the series of experiments**, is there a limiting reagent in each one of the experiments? Is the identity of the limiting reagent the same over your entire series of experiments? Explain using the **observations** from your experiments.

{Type answer here.}

2. (6 points) What trends do you observe in your graph? Describe the trends and what they mean in relation to the limiting and excess reactant(s) you identified in question #1 above? Do the trends meet anywhere? If so, what is the significance of this point?

{Attach graph here. Be sure it is large enough to be easily readable.}

{Type answer here regarding any trends and meeting points.}

3. (6 points) **Based on your experimental results as shown in your graph**, write a balanced equation for the reaction of aluminum with hydrochloric acid and **explain (referring to your graph where necessary)** how you determined **each step** of the process of balancing the equation. Be sure to use subscripts and superscripts correctly when typing the chemical equations. If you can’t find an arrow character you can use an equal sign for the arrow. For mathematical calculations you must use Equation editor.

{Type answer here.}

4. (3 points) Does the experimentally-balanced equation determined in question #3 above agree with the balanced equation based on predicted charges from the Periodic Table? What is the percent difference (percent error) between the two equations? Use Equation Editor for calculations and explain in words also.

{Write the balanced equation here that is based on predicted charges from the Periodic Table.}

{Show percent error calculation and explanation here.}

5. (2 points) Describe the procedure and results (including graph and balanced equation) of a group who used an experimental procedure different from yours, that is, they changed a different variable than you did. Do their results confirm or refute your findings?

{Type answer here.}

See the attached rubric for more detailed information about grading.

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|  | **Unsatisfactory** | **Borderline** | **Satisfactory** | **Excellent** | **Pts.** |
| **Q#1**  **Lim. reactant/observations** | No limiting reagent identified and no explanation.  **0 points** | Limiting reagent is identified.  **1 point** | Explanation of limiting reagent is unclear or not solidly based on experimental observations.  **2 points** | Explanation of limiting reagent(s) is clear and based on experimental observations.  **3 points** | 3 pts |
| **Q#2**  **Trends/ transitions** | No graph  **0 points** | Only trends are identified.  **1-3 points** | Trends are related to limiting reagents but the significance of the meeting point is not correct.  **4-5 points** | Proper identification of trends and the significance of the meeting point.  **6 points** | 6 pts |
| **Q#3**  **Experiment-ally balanced equation** | Experimental data is not used.  **0 points** | Calculations based on graphical data but units are not shown and work is not explained.  **1-3 points** | -1 pt for either no units in calculations and/or explanation not very clear.  **4-5 points** | Calculations based on proper graphical analysis, units shown, calculations explained well.  **6 points** | 6 pts |
| **Q#4**  **% error in equation** | Microsoft Equation not used for calculation.  **0 points** | **1 point** | Incorrect calculation of percent error between two equations.  **2 points** | Correct calculation of percent error between experimentally determined chemical equation and Periodic Table predicted equation.  **3 points** | 3pts |
| **Q#5**  **Comparison of diff. procedures & results** | **0 points** |  | **1 point** | Description of alternative procedure, 1pt.  Reasonable comparison of results, 1pt.  **2 points** | 2 pts |
|  |  |  |  |  | 20 pts |